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A report of the Western Regional Conference on Educational Media Research held at Sacramento, California, April 20-22, 1960, was presented. The conference was held to review and help chart future directions in research, experimentation, and the dissemination of information relative to new instructional media. The conference had four purposes: to provide current information regarding Title VII policies and procedures and to stimulate additional interest in the opportunities available under Title VII of the National Defense Education Act; to provide an occasion for exchanging information regarding current Title VII projects and other research in the use of motion picture, television, radio, or other new media; to identify areas of needed research involving the use of new technical developments in communication; and to explore methods for effective dissemination of research findings and for the related implementation of better methods of instruction involving the use of the new media.

Reports on new media included "Opportunities Under Title VII" by C. Walter Stone, "Current New Media Research -- Title VII" by C. Walter Stone, "General Status" by William H. Allen, "Critique of Research" by Lester F. Beck, "Television" by C. R. Carpenter, "Teaching Machines" by Arthur A. Lumsdaine, "Direction for Theory in Audiovisual Communication" by James D. Finn, "Needed New Media Research" by C. R. Carpenter, "Larger Research Patterns" by William H. Allen, and "General Issues" by Lester F. Beck.

Recommendations of the conference included implementing needed research, building dissemination practices at State and regional levels, translating research into practice, and guiding the impact of technology on modern education.

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The NEW MEDIA in EDUCATION

A Report of the Western Regional Conference on Educational Media Research held at Sacramento, California, April 20-22, 1960

Edited by

JACK V. EDLING

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CALIFORNIA	OREGON
HAWAII	WASHINGTON

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Preface

The "New Media" in education apparently are a result of twentieth-century technology. In any event, changes are rapidly occurring in the *means* of instruction, and a new technology is developing in education as part of this change. The Congress of the United States in the National Defense Education Act of 1958 recognized the relevance of these developments to national problems and with reference to *more adequate educational opportunities* stated, "The defense of this nation depends upon the mastery of modern techniques developed from complex scientific principles. It depends as well upon the discovery and development of new principles, new techniques, and new knowledge."

Title VII of the Act is totally concerned with *Research and Experimentation in the More Effective Utilization of Television, Radio, Motion Pictures, and Related Media for Educational Purposes* and the *Dissemination of Information on New Educational Media.* The conference, from which this report emanates, was held to review and help chart future directions in research, experimentation, and the dissemination of information relative to these new instructional meida.

Dr. Roy E. Simpson, Superintendent of Public Instruction and Director of Education, State of California, Department of Education, in opening the conference identified the unique characteristics of Title VII. He said, "The other titles of the Act are somewhat of a crash program in that they are for immediate reform and improvement. Title VII is not in that classification. It is a crash program of a more long range development and is aimed at harnessing the forces which are going to help improve this educational crisis and to make those changes which are the purposes of the Act.

"Here in California we are using NDEA funds to reform and improve our public schools. We have also been using our own resources to accomplish similar advances in the fields where Federal funds are not available and between the two we have made certain good records."

After enumerating recent changes in the California program of education, Dr. Simpson continued, "There is improvement then in the present instructional program. What also is needed is a program built on new tools provided by this space-age technology. It is for this reason that Title VII stands out from the other titles of the Act.

"Small though its appropriation, it is providing the groundwork for what must be an historic infusion of new instructional techniques into the schools. I refer particularly to television and to teaching machines. I might include the electronic equipment of the language laboratories, but that infusion has begun.

"Like any new machinery, there are bugs to be worked out. Like other machines, however, the need for them is so compelling that the leisurely trials often accorded new equipment are a luxury we cannot afford. Hence the importance of Title VII and the dissemination of its results. Much of the work to be done is not merely with the new machines. It is also with those who will use those machines in the schools.

"I tell you no secret when I say there is some reticence about accepting these machines in the classroom. This is a matter of importance equal to that of developing the technical equipment. Let me quote a man who perhaps knows this better than any other person in the world. I am referring to Thomas J. Watson Jr., the President of International Business Machines, Inc. He was speaking in Los Angeles at the dedication of the Data Processing Center and he made this admission of IBM's program: 'I suppose we always knew that computers were dumb, blind and have no I.Q. at all, but in our great rush for progress in the business world we have given insufficient thought to the people who were the important element in the ultimate success of what we are doing.'

"He was referring to the persons who must make IBM's giant electronic brain work. The machines will be effective only if the persons who run them understand them. The same warning applies to education.

"I believe those who planned this conference realized this when they placed strong emphasis on the dissemination of information. There is something of the big brother and the slot machine in this equipment. It is going to take a lot of disseminated information to change those images, but change them we must. The scientists and their more practical brethren, the engineers, are going to change our lives even more in the next twenty years than they were changed in the past twenty. Education must change with, or ahead of, most of the rest of the nation, and both men and machines will be involved.

"Title VII has the singularly vital role of boosting that change in both. The atmosphere necessary to that change will be reflected in the work at this conference. So I say to you and those of you who have prepared this program, we have an excellent opportunity here to start the things which we know must be done.

"We need to move and we need to move rapidly. I congratulate those of you who have come to us from these other states, your presence here indicates that you are alert and that you are willing to carry back to the people with whom you work the importance of the job we have ahead of us."

Sacramento, California
April 20, 1960

Foreword

The Western Regional Conference on the New Media in Education had four purposes. Specifically, these purposes were to (1) provide current information regarding Title VII policies and procedures and stimulate additional interest in the opportunities available under Title VII of the National Defense Education Act; (2) provide an occasion for exchanging information regarding current Title VII projects and other research in the use of motion pictures, television, radio, or other new media; (3) identify areas of needed research involving the use of new technical developments in communication; and (4) explore methods for effective dissemination of research findings and for the related implementation of better methods of instruction involving the use of the new media.

Dr. Kenneth D. Norberg, Professor of Education and Coordinator of Audio-Visual Services, Sacramento State College, in presenting "An Overview" on the "Purpose of the Conference" stated, "These are reasonable objectives and I think they are valid in that they do reflect the intent of the Title VII program and the interest of the planning committee. Perhaps, however, there is a need for some elaboration and refinement. I should like to make just a brief comment about each of these objectives.

Our first purpose concerns the stimulation of interest in Title VII. But, actually, I think that we should be very careful to point out that stimulation of interest, that is bare interest in the program, is not actually a very valid or defensible objective. I think that Walter Stone would bear me out in the statement that he is not interested in promoting new business, as such. A more important consideration is the kind of interest we are generating in the program. Does the interest actually reflect some appreciation of the intent and purpose of the Title VII program?

So I should like to reword this objective to read something like this: that we are interested in stimulating interest that reflects some common understanding of what the Title VII program has set out to do. Of course, we are also interested in exchanging information about what is going on, what Title VII projects are in progress, what is actually developing in the field through the support of this program. Here the bare exchange of information is important, but again, it seems to me it is important to see this information in context. Information on individual projects not seen in the context of the total program or without reference to the objectives of the entire program can be misleading. Here we should be anxious to see the projects viewed in the context of the total program and with regard to the intent of the program.

The identification of areas of needed research is certainly a critical objective. This involves an assessment of what has been done and what has not been done. It also involves looking critically at what is being done to see how it can be done better. Finally, it involves looking at the underlying assumptions or theoretical frameworks that are being used by researchers in conducting investigations in this field. Here again, is an extremely important qualification of this objective because sometimes whole areas of investigation are overlooked simply because an adequate theoretical framework has not been developed. This is demonstrated, for instance, in the field of psychology where the questions which you ask with regard to perception depend upon what kind of theory you entertain about perception and the nature of this kind of human behavior. Both unexplored and undefined problems exist here.

The fourth purpose has to do with dissemination. Our concern here is about the dissemination of research findings to researchers and also the dissemination or research findings and other pertinent information to practitioners. There is in this field, and in other fields in education, a critical need for a better means of disseminating research findings.

The U. S. Office of Education is keenly aware of this problem and is now conducting a feasibility study to see whether some system of disseminating research information in this field and possibly in other fields in education can be set up. In addition to the needs of researchers, we have the people who are practicing what the researchers are researching and here we have again two kinds of needs. One is the sheer need of information about what the research findings are and the other is the need of translating this information into some kind of actual result—some practice in the classroom. The entire program has been developed to accomplish these four objectives."

Sacramento, California
April 20, 1960

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part 1.

Opportunities Under Title VII

Dr. C. Walter Stone, Director, Educational Media Branch, Division of Statistics and Research Services, U. S. Office of Education, spoke on the "Background, Development, and Present Status of the Title VII Program of the N.D.E.A." Information which would be useful to those who are interested in participating in the program has been extracted from his conference addresses and is herein summarized.

By C. WALTER STONE

THIS is a kind of stockholders report. You and I, as citizens, are investors in the Title VII program. Let's view it in that light.

Now for those who may not be up-to-date on the nature of the program, perhaps it will be helpful to give just a little background before we review in any detail the present status of Title VII research and dissemination program developments. To start with, it is probably wise to remind ourselves that Title VII is, indeed, a very small program by Government standards. It is 18 millions of dollars authorized—(I learned the vital difference between "authorization" and "appropriation" only after reporting to Washington)—for support of research, experimentation and the dissemination of information dealing with educational uses of radio, television, motion pictures, video tape, etc. Actual appropriations have been: $1,600,000 in the first year (a reasonable sum when you consider the fact that it did take a while to launch the program); $3,000,000 during the current fiscal year, which ends in July. And I believe that we shall be hoping to receive almost the full appropriation authorized during this coming year and for the year which follows, i.e. $5,000,000 each. It is a four-year program and it is a program which has achieved much, thanks to efforts put forth by many of you attending this conference.

We have received from you and from others across the country more than 600 applications for research. We launched in January of this year a Small Grants program providing grants of up to 2500 dollars. This new program will make it possible to recruit and to attract more new personnel to work the field of new media research and to support some projects which up to now could not be handled. Of the grant applications which have been received to date, the Advisory Committee on New Educational Media (which has total responsibility for ranking and rating) approved some 85 for awarding.

Part B of the Title VII program, you will recall, deals with dissemination and is a contract program. Thus far some 25 types of different dissemination activities have been launched under contractual arrangements. These range through surveys and studies to determine the need for increased or improved use of the newer media to the publication of guide books, handbooks, bibliographies, manuals, films and other materials which may help to tell the story of research and its applications in the field. The program also provides for the development of advisory and consultative services and for demonstrations.

Title VII—Part A

The Research and Experimentation program, Part A, authorizes three main kinds of activity. First, it calls for studies aimed at getting at ways in which newer media can be utilized more effectively to present academic subject matter. (Title VII, by the way, is *not* limited to foreign language, science and mathematics. The reason: Research done in a particular area might well apply to many subject matter fields. Title VII does, indeed, cut across many fields and many levels.) Second, there are the studies involving training of teachers for improved use of the newer media in education. I might say here that while we have a certain number of projects in the field of teacher education, this is an area of deficiency. Finally, the Title calls for support of studies which are directed primarily toward finding new and improved means of employing existing newer media for all types of educational purposes.

And then there is a wonderful phrase which applies both to the research program and the dissemination program and to which we refer to periodically in justifying and explaining projects underway; it reads—"and related activities." We are supporting many types of projects in each of the categories just mentioned; utilization or adaption of the new media, teacher training, and the presentation of subject matter. But we are also authorized to support those other activities which may be related to each category, and this sometimes carries us afield, but we think within the framework of the Act.

Research Grants

Approximately one-half of the grant applications which have been received to date are in the field of television: Television for teacher training; television for a variety of purposes (open-circuit and closed circuit); use of kinescopes, video-tape and filmed presentations. Approximately one-half of the approved grants reflect this interest in television. A third of the grant applications, and indeed of the approved grants, are concerned with the development and testing of new kinds of materials including films, graphics, special presentations and ways these can be used in education. A small but very significant cluster, and I might add a cluster which is growing rapidly, has to do with the automation of instruction, or tutorial instruction, as may be accomplished through the use of teaching machines.

Television

The television grants break down generally into these categories: First, there are those given specifically for purposes of aiding teacher education—using television as a means of enabling the teacher in training or, indeed, the teacher supervisor, to observe what is going on in the classroom at some distance—second, the use of video-tapes and kinescopes to enable the teacher, or the teacher in training, to see himself as others see him—third, the use of television for interconnection of classrooms and groups for educational demonstrations and processes. There are several projects of this nature in California, Minnesota, New York and across the country. One exciting result of grants which have been made in this area is the fact that the project directors responsible have expressed a desire to meet together for purposes of thinking through what each is doing and how each may build upon the fruits of what the other fellow has done. So each of these grants is not only an entity unto itself. It can also be seen as part of a total picture with project directors working together for the general good and improved use of television in teacher education. Bridging the gap between high school and college is another kind of television grant which has been approved, for example, at the University of Miami. This project was intended to help youngsters to correct deficiencies in their preparation in the fields of mathematics and English and in other subjects so that when they get to a college campus they are going to be just a little bit more ready to succeed.

Another interesting program involves the use of television to bridge another kind of gap. This is the gap between the home and the school, a gap which both pre-school children and their parents must bridge as youngsters prepare to enter the school program at the kindergarten or first grade levels. "Readiness" is another way to describe this. Television is being used to help orient the pre-school youngster and his parent to what the school program means in an interesting project being developed in Pinellas County, Florida. TV is also being used for the purpose of sharing faculty resources—knitting together, network style, institutions of various sizes and dimensions and with different kinds of curricular aims, different student bodies that come from different sources. We have a major project of this type in the state of Texas where 11 institutions of higher education are working together to see what can happen administratively when faculties with different objectives share resources through the medium of a closed circuit, micro-wave relay television network system.

Television is being used to reach the gifted. Perhaps one of the most dramatic projects in this field is now being developed in the state of Maine where television is being used to reach isolated rural school districts with special programs in math and in science. It is a complementary sort of instruction offered for 36 weeks on a daily basis so that those youngsters who have the talent and ability, but who may not have needed school resources immediately at hand, can, thanks to television, complement, supplement and enrich the instructional opportunities made available to them. The project is being conducted by the Maine State Department of Education. Two commercial stations share in the work.

Teaching Machines

Automation of instruction, the tutorial machines, the learning devices,—there are a number of projects in this area. Other sessions at this conference will be devoted to the topic, so I won't dwell on Title VII projects, other than to report now that there is one project in Pittsburgh which looks toward the development and use of new devices, new sorts of teaching machines, as a complement to televised instruction. Such use may ultimately enable the individual student to follow up the kinds of things that he receives through televised instruction with self-study and self-learning aids. I think you can see immediately what this means in terms of the homebound youngster, the adult or the individual who has some difficulty in meeting regular classes. Television *plus* teaching machines; again, a new system of instruction being developed. There is also a project in New Jersey which I think will interest you. This is the Edward R. Johnstone Training Center project to develop new devices, teaching machines if you like, to help mentally retarded youngsters to master concepts in various primary learning fields, reading, for example.

One great danger in this whole area of teaching machines is that development of hardware may outrun the programming available for the machines. The other side of this program must also be mentioned, however. Development of new kinds of hardware frequently does suggest new types of programs which can be developed. So, you must look at this development from more than one point of view. There is no question about it, with respect to teaching machines and to interest in this area. We are receiving more and more applications all the time, and it probably will be one of the areas of paramount interest in media research and experimentation for several years.

Title VII—Part B

The dissemination program is a contract program in which work to be done is initiated by the Office of Education. We welcome suggestions from all sources at any time. The primary jobs are to tell the story of research and to tell the story of significant teaching programs and practices and to do both of these as expeditiously as possible. We accomplish these tasks through surveys and studies, through publications of all kinds, and through conferences and demonstrations. Essentially we try to answer three questions as we move through contractual efforts. First, where are we now in this field? Second, where should be be going? And third, how do we get there? —telling not only *how* we get there but also showing and demonstrating through pilot experiments and projects. The chief dimensions of the dissemination program at this time might be described as three. First, there are the contractual activities and staff work concerned with answering basic questions in the field; second, the meeting of urgent information needs; third, launching a new and long-range information program. The areas into which Title VII dissemination contracts fall are essentially these. First, telling about Title VII itself: One thing we have discovered in trying to go about the country and in working with individuals is that we are not doing our job as successfully as we would hope in getting the information out to the field. So we have developed several contracts to help us in this area, including the use of exhibits, brochures, production of filmed case study reports on who's doing what, where, etc. Second, under the mandate of the law we are working through contractual and other means to achieve maximum coordination of similar efforts in the field. This means coordination with agencies, institutions, foundations and other groups discovering all appropriate ways in which we can blend efforts for maximum achievement.

Specifically, Title VII contracts for dissemination are aimed first, at research and information about research; second, the materials themselves; third, administrative problems—e.g. equipment and facilities, teaching methods and utilization; and finally, professional leadership and training. Dr. Norberg cued me earlier regarding the possibility of mentioning a few things about our research information program and some of the problems we have in that area. Let me simply say this, I don't think I need remind anyone in this group that we are all handicapped seriously by the fact that it is almost impossible, not only to find out who has *done* what, but to find out who is *doing* what, where, plans being made, projects, and results. This doesn't mean we aren't improving our efforts by telling the story through professional journals such as AudioVisual Communication Review and others. But we simply do not have available to us a bank, a reservoir of such information with abstracts available to all, and the kinds of critiques and syntheses we need. One of the first questions asked about the dissemination program was, "Can we, and if so, how can we develop some type of service program which will make information about research readily available?" A study was launched at Columbia University which examined the literature in this field. The investigators talked with many researchers in the field, the consumers of research and perhaps with some of you. Shortly final recommendations will be advanced. It is our hope that within a year or so we may launch a regular research information service program, working in concert with agencies in the field but probably looking particularly to the U. S. Office to establish the needed "reservoir," or "bank."

Of special interest to you also may be a contract awarded to the University of Indiana. This contract was developed to determine the adequacy of existing guides to materials including films, film strips, slides, tapes, etc., normally used in instructional programs. If present guides are not found to be adequate, then to offer some recommendations as to what ought to be done about it. I don't think anyone in this room will deny the fact that now accumulating on our desks and tables are more and more catalogs mailed by more and more agencies, each of which try to tell us what is available and where. However, the overlapping of these aids, the gaps in all, inherent problems affecting use, and finally the sheer difficulty (for the individual teacher) of gaining real access to these materials in many parts of the country is so great that something has to be done! Our questions to the University of Indiana were: Is this a bottomless pit? It there something that can be done about it? If there is, let's do it! We think now that we shall have some answers before the end of the year looking toward development of some new type of indexing service, on a cross-media, cross-subject basis which will complement the work now being done.

The Stanford Symposium

At this point I should like to highlight a book produced recently with Title VII funds. The book is called *New Teaching Aids for the American Classroom.* Its title does not quite reveal that this is a symposium on the state of research in instructional films, television and teaching machines. The names on the cover are Carpenter, Hall, Hilgard, Hoban, Kanner, Lumsdaine, Riley, Schramm, Spalding and Tyler. The conference was held at Stanford University. This book tells the story of where we are in education in terms of some of our problems. It tells the story of the needs for research, particularly in television, in film and in the development of teaching machines. It tells the story of problems we face in applying the results of research.

In short, it presents a very fine summary of the research which is being done, work that needs to be done, and how research activities and results may be fitted into an educational setting. We worked with Dr. Wilbur Schramm at the Stanford Institute of Communications to get out a preliminary run of this book on a free distribution basis. We are now working very hard to develop a contract which will make copies available widely across the country. I commend it to your attention as a *very fine* and current status report on the media, and needs for research in this field.

Long-Range Dissemination Problems

Among problems which plague us in the dissemination program are those of developing improved ways of thinking about how materials should be made available. What types of service arrangements should be developed, etc.? Before we can answer such questions and thereby settle a number of long-standing jurisdictional disputes in schools and colleges as to who should handle the language laboratory or who should handle teaching machines, there needs to be some kind of theoretical framework established. A pertinent contract was recently negotiated with the Association for Supervision and Curriculum Development.

Contracts to help get answers to these basic information problems and to look toward solutions are then some of the kinds of work which are being done under the dissemination program. We also have urgent and long-range needs. Where are we going in television? What about the possibility of developing regional and state networks? How can we expect to use television to complement existing instructional programs? A seminar was held last fall in Washington by the National Association of Educational Broadcasters. This seminar brought together most of those individuals from various parts of the country who have something significant to say on this subject. Copies of the proceedings are available to those interested. The report has been distributed widely and serves as a kind of foundation on the basis of which our thinking about potential cooperation in this field.

The Modern Language Association recently tackled another urgent problem for us. What materials are available in the field to help improve instruction in modern and foreign languages? A guide was published last summer on this subject.

Listed under the heading of "long-range" dissemination problems are several contracts developed to hold conferences (such as this), contracts developed to tell the story of new teaching methods and practices and to show teachers and leaders in the field how the media can be employed effectively in education. Also we have awarded one contract with the Society of Motion Picture and Television Engineers to help give us a greater perspective against which we can better see the place of existing equipment in the field and assess its adequacy. As some teachers and specialists have phrased it, today's equipment is too frequently heavy, ponderous, inadequate and does not take advantage of new technology available. There is, I am certain, no secret revealed in saying that we did have a little trouble in getting this contract underway. The reasons in no way reflect adversely upon various commercial industries who will participate in the activity. But there has been the ever present and difficult problem of patent rights facing us. What happens when an individual or a particular company represented at a meeting or a conference reveals work his company is doing inadvertantly. Well, this is the human side of Title VII.

In summary, the dissemination program is aimed at satisfying basic, urgent and long-range needs for information and demonstrations through contractual efforts.

Current Educational Problems

Nothing about Title VII will have any significance unless you see it in the context of current educational problems. Here, if I may, I'd like to depart from talking more or less at random and speak to you very directly. I think I've given you enough evidence to show that some progress has been made. In launching research and information programs under Title VII, some progress has been made which eventually will help to provide more learning and better learning for more people in less time. But despite the progress, represented in 85 research grants and 25 types of dissemination contracts, I'm afraid we face a great danger of resting content when, as a matter of fact, we've hardly begun to do our job. We are running the risk, I believe, of failing to meet head on and very productively some of the most urgent educational problems of our time. Unless our thinking about teaching and learning processes and plans for organization of efforts can be focused and can be channeled cooperatively and effectively to bring about constructive change, I think we are in for real trouble.

Much of what follows will be included in an article to be published soon. But I would like to read a few paragraphs because they are especially pertinent. Grist for the daily newspapers and the magazines we read are the "numbers" crisis in education. The shortage of qualified teachers in so many fields, the vastly increased numbers of students to be taught, and accelerated demand for highly trained and skilled workers in technical and scientific fields are not yet adequately being met. Educational inequities still exist among the states and also in rural versus urban areas. In too many places across the nation public school work still means some kind of a lock step routine for the use of narrow texts, and fantastically enough in the modern age, it also means little or no heat in the schools in the middle of winter, outhouses, the cleaning of these as a teacher's duty, etc. In short, we have not yet successfully learned to balance our services in education, services not only to the groups mentioned, but to many special groups including the retarded and the gifted.

We are plagued by outmoded buildings and increased building costs and there are some recent estimates that show that some 45 billion dollars is likely to be the public school budget as early as 1970. According to some of our leaders and our scholars in this field, we are also facing another kind of a problem. It is a declining respect for the intellect, as distinguished from bending our efforts in education to create new but sometimes almost unthinking applications of intelligence. That is to say that in our effort to develop very much needed bodies of trained man power to focus educational attention on particular fields of endeavor, we are doing some important work, yes, but we may be failing at the same time to provide an adequate liberal education which will enable the individual to really become emancipated from the strings and the pressures which seek to force the individual into habits of conformity. While we are at the same time failing to provide the necessary drills to develop vigorous self-control which an individual can exercise to develop fully his capacities for self-expression and creativity. Even in the fields of newer media, in which all of us are working in today's education, there is an unfortunate, and I think a much too frequent tendency to use the media simply as pipelines for achieving a flow of materials, and a methodology which is just, frankly, anachronistic in our times.

The fields of media specialization have for a long time been subdivided by jurisdictionally oriented disputes, by competitive struggles on behalf of print versus film, and film versus radio, and radio versus television. Now almost all of these are being re-examined in relationship to teaching machines. Of course, this is the view that one can get if they are looking through, and thinking through, dark colored glasses. But the problems are very real, and they are not as yet entirely resolved. I think they do deserve your consideration as stockholders, as partners in the kind of work that Title VII was intended to support.

Educational Opportunities

It may be helpful to give you a little more constructive view than this, perhaps one which may be a little less emotionally charged, and to take a look at the situation from the positive side. Because we are, I think, thanks to the provisions made available under the Title VII program, and many other programs as well, converting some of these crisis into opportunities. As a result of these efforts we are being privileged to witness the development of many new ways and means to meet the demands of modern society, demands for increased, improved, and accelerated learning. Among the more prominent trends observable in the field are the development of a new clock for the school day, a new calendar for the school year, a new building for the school community, a new division of labor between the home and the school, new relationships between school and college programs, new materials, and new methods for the improvement of teaching and learning. No longer is the classroom conceived simply as a laboratory, a library, or an individual study hall. increasingly it is being regarded as a window on the world. and new relationships are being established between content and sequence, between process and form. New methods of presentation are being tried and new tools are being employed to achieve goals which were previously unrecognized or unattained.

I believe the Title VII program does have to be viewed in this context. It has to be seen against a background of problems which we are trying to resolve. Otherwise, there is a danger that it will foster gadgeteering for its own sake. The newer media have so much to contribute, and there are so many ways in which they can contribute, that sound research to show us those ways is vitally needed. The sound experimentation and demonstrations, which will show the practices that will achieve effective use of the media, are what the various support programs developed under Title VII are intended to accomplish.

Future Directions

In closing this part of the presentation, let me take another look ahead at the future. Again I should like to borrow from the book, *Teaching Aids for the American Classroom,* because it does say pretty well, I believe, where we are and where we need to go. In the Foreword of this book, Dr. Schramm makes six points which seem to me to be the message which is appropriate to put before this conference, and to repeat as many times as may be necessary, for those of us who are especially interested in research.

To begin with, we need a moratorium on repetitious research activity. We know, for example, that these newer media can teach. Let's not go on proving the fact. Rather, let us find out what the media can teach best, and how these media can be best employed. Second, we need much more work in the whole area of programming and in development of teaching machines. Third, we need to study the media in their social contexts. We have done very little about this, and it is difficult to get at ways in which these can be employed most effectively in or out of a classroom setting.

We need to give more attention to the media as parts of systems for teaching and learning. So often we talk about the film, or the film strip, the telecast, video tape, or the radio program, and do not see relationships to other things. Let me give you an illustration tied to some questions as to what the facilities of tomorrow will be, what the teacher of tomorrow will be like, and what the learning process may become. Let's take the area of modern foreign languages.

I don't know what Dr. Nostrand might say about this, but I've heard it said by various people that we may be looking toward an era in which not only will language training begin very early in the educational process, but it will be a totally different kind of process. Television will bring it into the home. The parent will become an active partner in the teaching process with conversations around the table, etc. Thanks to new developments in technology, transister tape recorders, etc., it will be possible to practice language skills at home. The student will then come into the school (whatever it turns out to be) the next day and be working in the language laboratory for further development of his skills. A tutorial kind of instruction will enable him to grow at his own rate to go as far as he is able. The role of the teacher, who will then have been emancipated from simple presentation of facts, will change greatly. Also there will be supplementary textual materials of a sort not yet produced. Do you see what I'm getting at here? We need to think not of any one particular aid, a telecast, tape, textbook, or of pictures. We need rather to envision new systems of instruction, and we need to think of these systems in relationship to new definitions of teaching and learning, and the facilities in which teaching will actually be taking place.

We need also to give increasing attention to problems of motivating learning because we know so little about it. We really know very little about how to achieve high motivation through the use of newer media.

We also need to give special attention (and several sessions of this conference will be doing this) to the utility of research. One speaker at the Stanford Seminar was Dr. Ernest Hilgard. Dr. Hilgard developed for participants an idea he called "the theory of application." One of the points that he made was that we must find ways, as we go forward in the development of research in this area, to involve the teacher as a partner in the research process. Also, if we are going to make real changes in our teaching programs and practices, we must go even beyond this to involve representatives of the community at an early stage so that they can be committed to the directions which some of the changes implied in research would direct. Once again, I commend to you *New Teaching Aids for the American Classroom*. But don't descend, please, on Dr. Schramm, Palo Alto, or on the Office of Education, immediately. We are now seeking ways to make the publication widely available.

The objectives of this conference have been put before you, and in closing I should like to add as a kind of complementary summary of related objectives only this. It would be our hope that there would be some new form of cooperation developed among institutions within states, across state lines, and on a regional basis—forms which perhaps would enable some things to be done in research, experimentation, and dissemination which haven't been done before or as well. I would add further that, perhaps on a regional basis, we need to be looking more and more to new centers which are really well equipped and properly staffed, served by all and serving all, supported by many sources, to enable us to get more of the total job done. Perhaps a conference such as this, and perhaps the recommendations which will come from its membership, will take into account such opportunities.

In capsule form, perhaps best put as "Impressions of Title VII," here then is a research grant program and a dissemination contract program aimed at improving educational uses of what we have come to call the newer media. More importantly it is a program aimed not only at resolving some urgent problems in the field, but directed toward building into the educational process a new recognition of the importance of research and experimentation as means of defining and solving educational problems. Personally, I feel that if we accomplish just this much as the result of the public support represented in Title VII, we shall have done a very great deal.

Also, we have other problems to meet which are the challenges of our time. The crises in education have been identified. The national needs which are symbolized by Sputnik and Lunik are much more critical than some of us sometimes realize because we are a little afraid and sometimes withdraw a little from comparisons in this area; the inequities which exist among the states, rural versus urban; the hope that Title VII, and not only Title VII but all research and experimentation supported from many sources, can be seen in relationship to these challenges; and all of these may help to achieve more learning and better learning for more people in less time. Another way to say this is that these two new programs, which are being developed by you in research and in dissemination, are efforts which are going to help us resolve some of the most basic and urgent quantity problems with improved quality.

Finally, we are going to preserve individual freedom to choose the ends which are to be accomplished. The words "big brother" were used this morning and at times I can understand why the connotation does arise. But as this program goes forward, as new and improved uses of media are developed, as better programs are organized, they will serve to complement and implement and supplement the basic instructional efforts which we have in mind. They are not replacing, or doing away with, or being superimposed, or in one way or other doing anything except providing more learning and better learning for more people in less time. It sounds like a slogan. I hope it isn't too trite, I do think it underscores the picture which Title VII is putting before you.

part 2.

Current New Media Research Title VII

The second major objective of the conference was to: "Provide an occasion for exchanging information regarding current Title VII projects and other research in the use of motion pictures, television, radio, and other new media." Again, Dr. C. Walter Stone was called upon to explain, "How Title VII Operates." The essence of his remarks are quoted below:

By C. WALTER STONE

I THINK you would be interested to know that the Title VIII program is administered in the Division of Statistics and Research Services of the Educational Media Branch, U. S. Office of Education. The assistant commissioner in charge of this program and other related grant programs is Dr. Roy M. Hall. I want to say this for the reason that the Title VII research program is articulated to some extent with other very important programs in the field of education, e.g. the Cooperative Research program, developed under Public Law 531, has no special interests or emphases as we do in Title VII.

The Educational Media Branch has been established to administer the Title VII program and other audiovisual and related interests in the Office of Education. At present the Branch staff includes 27 positions, and we anticipate that more will be added each year. The Branch administers four separate types of programs. First, there is Title VII. Second, there is a special program which makes available a captioned film service for the deaf (something like the "books for the blind") service maintained by the Library of Congress. There are the continuing services of the Office, and there are special radio and television projects. In short, the new media interests of the Office of Education have been brought together in one branch which incorporates among other things responsibility for administering the Title VII program.

My own position is that of Branch Director. Our senior research coordinator is Dr. Warren F. Seibert. Dr. Seibert is on leave from Purdue University where he is Director of Television Research. He will return to that post early in the summer. Dr. Seibert is responsible for the research grant program. Queries, telephone calls (and please, all telephone calls) can go to Dr. Seibert for clarification of research activities. The dissemination program, Part B, is the responsibility chiefly of Dr. James McPherson. Dr. McPherson came to us from the Modern Language project at Wayne State University and prior to that was Executive Secretary of the Department of Audio-Visual Instruction, N.E.A.

Applications for grants under Title VII may be submitted at any time. However, the established deadlines are these: February 1 and August 1. What happens when a research grant application has been properly completed and is submitted to the Office in 30 copies plus an abstract? The research grant application comes into the office and is acknowledged as soon as possible. There is usually a formal letter. Then the proposal is examined by staff, described, characterized, and inscribed for purposes of record on the equivalent of a McBee Keysort card. Next, projects of a similar character, and sometimes even of diverse character, are reviewed singly by specialists in various parts of the country. We employ some 15 to 25 such consultants to help us do the job of looking at research proposals as individual pieces of research. More specifically, these questions are asked: Will the hypotheses advanced in a particular study actually be tested by the procedure which is being advocated? Are the statistical procedures proposed germaine to the job that needs to be done? Or, does it represent (as I'm sorry to say is too often the case) a kind of "window dressing," i.e. "if we have time, and so on, we'll get around to analysis of co-variance, etc." There is a very careful look at whether the methodology to be employed is going to be applicable to test the hypotheses which are advanced. In short, each proposal is scrutinized by these specialists working as individuals on individual proposals and evaluating each accordingly. Next, these field readers, as we call them, sit together at one point in time and go over various kinds of things. But in no case are they responsible for, concerned with, or otherwise directly interested in the relationship of this proposal to all other proposals which have been submitted by the field. This is a different responsibility.

All of the information obtained from field readers, plus supplementary information which we might get from a phone call, a letter, or by coming out to see you, finally is "wrapped" in a package which is then mailed to our Advisory Committee on New Educational Media. The Advisory Committee is a 14-man committee created by the law. Three members represent liberal arts and sciences. There are also three specialists in media and three specialists on public education plus the Commissioner of Education, who is chairman, and a representative of the National Science Foundation. It is their awesome responsibility to decide who, how much, and in what rank order. The Committee meets about twice a year.

Thus far, of more than 600 research grant applications which have been received, some 85 have been approved. What criteria did the Advisory Committee employ in evaluating these proposals? I would simple say, now, that the criteria have been summarized in written form, and that they ask the kinds of questions we would ask about any piece of research. For example, is this research significant? Where does it fit into the educational scene? It is important and, if so, why? Who else is doing related research? What about the adequacy of the facilities of the institution to support the kind of research proposed? What about the person or persons responsible for directing this piece of research? Is the design adequate to test the hypotheses advanced? Then, there is an old question of whether the project would be economically efficient? Does it cost too much money? Or, on the other hand (and this is very frequently the case) people in estimating research jobs, perhaps fearing that the proposal will not be looked at favorably, fail to state what the real costs of the project are going to be. In such cases, the judgment of the Advisory Committee will relate to whether costs are accurately estimated, whether too much or too little is asked, and how this reflects on the character of the institution and the persons advancing the proposal.

To this program has been added another dimension in the research field—the Small Grants Program. This new program has been established, in part, for the purpose of encouraging promising young researchers. This program provides grants not to exceed $2,500 in support of direct costs of research on ways in which newer media may be used in the teaching-learning process. The duration of each project is limited to one year. Applications must be submitted in the form of a standard Title VII application on or before the established deadline dates mentioned earlier.

The research grant program operates very much like a Foundation. It is competitive. Competition, however, is based on analysis of what has come in from the field. The office does not decide, and will not decide who should do what in media research. However, all of us are, of course, concerned to find out what the major gaps are, what the overlapping areas are. And so the conference held at Palo Alto under the direction of Dean Schramm and reported in the book which I mentioned this morning, helps us to identify needs in research. We are planning to publish other aids of this sort. The rate of research project approvals, which is about one in six or one in five, doesn't reflect necessarily upon the adequacy of the research proposals; it does, however, reflect the availability of funds to a very important degree.

The Title VII dissemination program, you will recall, has three main facets. First, there is development of surveys and studies looking toward the need for improved and/or increased use of the media; second, telling the story not only of research (completed under the Title VII program and under other programs as well) but of significant teaching programs through publications, manuals, guidebooks, handbooks, bibliographies, films and related means. Then, it has a third facet to it which calls for development, upon request of technical advisory services and demonstrations. Or, for lack of a better term, to show how in a particular area some new thing might be accomplished. The dissemination program is not competitive. It is not handled as our research grant programs are. It represents the Office doing its job in the same way each of you get out a publication, or hold a meeting, and do whatever else is necessary to tell your story of research, to demonstrate how things are done, etc. Suggestions are welcome at any time from any source. We may recommend to the Commissioner that particular projects be undertaken because they will benefit American education, that the results of a particular demonstration or project are likely to be generalizable and useful, etc. But it is a contract program with which we are dealing here. Suggestions are received in the Office, they are reviewed, and they are seen in relationship to priorities for types of program activities previously reviewed by the Advisory Committee. Then the staff goes out and initiates the needed contracts according to established procedures.

I need to distinguish again I think, very sharply, because there has been a little confusion between this area and the research grant program, where the initiative is and will remain totally with the field. The dissemination program uses a relatively small proportion of funds authorized for the total Title VII effort. It is a contract program where, based on suggestions received from all sources (but fundamentally determined by the Office doing its work), we set about the business of publication and what have you."

Classification of Research Projects

Here is a summary of grant applications which have been approved according to various classifications.

1. Classified by Media

Media	*Number*
Auditory Devices	1
Motion Pictures	14
Multi-Media	25
Non-Projected Materials	1
Still Projected Materials	4
Teaching Machines	4
Television, Kinescope, etc.	31
Total	80

2. Classified by Subject Matter Content

Subject	*Number*
Humanities (except Modern Foreign Languages)	4
Mathematics	3
Modern Foreign Languages	5
Multi-Area	8
Physical and Biological Sciences	16
Social and Behavioral Science	3
Teacher Education	19
"Other Areas"	22
Total	80

3. Classified by Grade Level

Grade	*Number*
Kindergarten-Primary (K-3)	1
Intermediate (4-6)	10
Junior High (7-9)	3
Senior High (10-12)	7
College and University and above	32
Multi-level	11
"Other" levels	16
Total	80

General Policies and Procedures

Following Dr. Stone's remarks there was a period of general discussion. Significant questions and the answers which were offered at that time were:

Q. What happens to the ownership of the by-products of research, be they film, film clips, tape recordings, or publications?

A. The products of research activity are normally thought to accrue to the college, university or agency which initiated the research. The government does share by virtue of the contract form which is developed, and by copyright and patent privileges. The Commissioner reserves the right to exercise certain prerogatives in this connection. However, the Commissioner would never do this to the detriment of the rights of an individual agency, and it says so in our policy statement. There are a number of questions which come up in relationship to patents, etc., and some of these are only going to be resolved when an invention which will revolutionize American education, let's say in a particular area, comes before us. But, in a general way, the answer to the question asked is this—let's say Dr. Norberg's institution developed some particular grant activity and out of the project comes a product. Because the institution, in this case Sacramento State College, probably contributed some portion of the total fund involved, and because this is a grant, not a contract, basic residual rights would rest with Sacramento State College. Again, however, because public money has been used, the Commissioner must reserve the right to make the product available as needed in American education.

Q. What provision is made for the revision of a grant?

A. This is a problem with which the staff has wrestled many times. You can see that it is possible, thinking only of the first 80 grantees, and because good research generates new research, to amend the program out of existence.

In fact, what actually happens is that, if for some good and sufficient reason you need additional funds to carry out a particular task germaine to the original project but which couldn't be done for reasons of lack of adequate estimation at the beginning, an amendment can be requested. It should be requested by letter to the Office. After review (and whenever possible) the request is approved. However, if the idea you have is in essence a new idea, discovered because you did receive the first grant and is really a new idea carrying you forward, then your request for amendment will be submitted to the Advisory Committee on New Educational Media who will view it as a new grant application. We have many examples of amendments and some examples of cases where the request has been denied.

Q. What is the final termination date of proposals now being received, inasmuch as the Title VII program runs out at the end of fiscal year 1962?

A. Generally speaking, a grant application submitted to us now could probably be funded for as long as 2 years and 18 months. The funds would come out of two appropriations, but the grant completion date could run beyond the actual close of the next fiscal year. I would, however, have to say frankly that I suspect that our Advisory Committee will be thinking in terms of closing out the program in proper perspective, and supporting only necessary mop-up studies which may be involved. So, I think the basic answer to your question is 2 or 3 years at this point.

Q. Would you care to say anything about the cost of these 85 grants? I will give you a general comment on costs and then some fairly specific facts. As of this moment, out of the funds which have been authorized subject to the availability of funds from the Congress, there have been funded in excess of 7 million dollars worth of grant and dissemination projects. Probably by the end of this fiscal year, this figure will be something like 8 millions of dollars. You might also be interested in the balance of dissemination versus research expenditures. Dissemination contracts will obviously increase in number as research is being completed and as the number of research grants decrease. At the present time the order of dissemination or information programs versus research is about 1 to 5. In other words, if you are talking in terms of 15 million dollars then you would be thinking of approximately 3 million for dissemination over the four-year span of the Act. Now what is the range and median figure for research grant applications? Proposal requests range from a few hundred or a few thousands of dollars up to a little over a quarter of a million dollars and considerably over a quarter of a quarter of a million in one or two cases. I think, probably, the median grant has called for support during about three years at a cost of somewhere around $80,000. But this figure means little. Projects vary in requirements and there would be no virtue at all in trying to pitch an application to a particular amount of money or timing requirement. However, in answer to the question, that is the range and the median.

Q. What provisions are there for the development of material production centers?

A. I have not made such an analysis but I won't try to duck the question. I think there is a real issue and a real problem involved. One of the kinds of programs we cannot support under the existing law is the development of production activities, per se. Certainly there is great need for experimental work in this area. But production activities, support of equipment and related things of this kind are not at the moment items supportable in a regular way. This means that when people come to us for elaborate equipment allowances, we have difficulty. Also, experimentation, in the sense of production is not something which can be supported regularly. In the future it may well be that one change which ought to be made in the program is along these lines.

Now, about the equipment allowance—you realize that it is 20% of the undepreciated balance per year of the experiment, and thus a three-year experiment would receive 45% to 48% of the equipment required to do a particular research job. Capital investment costs are not allowed, i.e. studios, transmitters, and towers, etc. (because this is not an assistance program). Worthy though an assistance program may be, vital though it is in higher education which has too little help at this stage, the job of Title VII funds is to buy the best research which can be obtained for the benefit of all, and two things are not generally so out of this: One is equipment, and the other is production. Such expenditures are limited simply because we don't have the appropriations needed.

Q. Why is there such a high mortality rate on Title VII projects?

A. There is an assumption being made here that one in seven or six or five is a high mortality rate. I rather doubt that, in light of the experience of other funding agencies, that this is quite as high as it might seem. I don't have an answer for the question, other than the criteria which are employed by the Advisory Committee and which have been pretty well tested on the field as likely to identify those projects which are most worthy of support. (Note: Dr. Lester Beck gives a detailed explanation of why specific proposals were not approved beginning on page 31.)

Q. When a proposal is not approved, is a critique given to the initiator?

A. The simple answer to this question is no. The reason for that is that when you get into details in trying to explain to an individual exactly what a situation is, it finally comes to a matter of judgment. The 14-man Advisory Committee appointed from many parts of the country has been established with the responsibility to review each project. Criteria have been developed. Applications are handled as has been described. Debating the issues of specific proposals in great detail is not consistent with the practice of any funding agency with which I am familiar. It would really create more difficulties than can be handled and, in part, because of the fact that there is just so much money which can be made available to do the job.

Dr. Stone concluded the session with the following statement:

It has been a very great privilege for me to have the opportunity to tell you directly, as best I can, where we stand with the program and what we are trying to do. I hope that you have received the information in the same spirit. Second, I hope that you will share with me the notion that while this conference is indeed supported with funds made available under the provisions of Title VII under the NDEA, its prime concern, and only concern, is with improvement of research, the dissemination of research findings, and the improvement of education. Following this clarification, we can now turn our attention to: What is this research? Where do we go from here? and not be concerned further with the provisions of the Act or new legislation.

General Status

Dr. William H. Allen, Director of Research, Department of Cinema, University of Southern California and Editor, **Audiovisual Communication Review,** *spoke on the topic "Status of New Media Research." His statements, primarily, summarize the accepted findings of pre-Title VII research and identify the characteristics of approved Title VII projects.*

By WILLIAM H. ALLEN

I HAVE the job of attempting to give you a status report on the research. I would really like to do four things. First, I would like to make some introductory remarks and get a few things off my chest relative to some of the directions education may be taking, some of the implications of the developments in technology and in the new educational media, and their possible effects upon education. Second, I will go over what I might call some levels of application of research knowledge in education. Third, I will discuss the status of research in the new educational media. And finally, to use with you a chart that was developed for the U. S. Office of Education for the use of the Advisory Committee showing the classification of current Title VII proposals.

I don't think we need to be reminded that we're facing some serious educational problems. This fact has been alluded to already and certainly was emphasized by Superintendent Simpson and others. Our particular attention is directed to the so-called new educational communication media, particularly the film, television, and the teaching machine.

Future Technology

I would like to suggest that we must give consideration to the technological developments of the future. These are the inventions and discoveries presently beyond our knowledge. They may be here sooner than we think and their impact on education could well be far greater than those media we already possess. In emphasizing the possible importance of these future discoveries, I think it is a sobering thought to remember that almost as recently as one year ago, the term teaching machine had not even appeared in the educator's vocabulary. I might add that of about 100 teacher-education students I now teach, only 3 or 4 had even heard the term. Yet, as you all know, the teaching machine is about the hottest item in the pedagogical market place at the present time. Therefore, when I include as yet undiscovered devices, materials and techniques among the media that need to be considered in educational planning and research, I am including something that is predictable but not definable. We will have it, but we don't know what it is.

If we look at the history of technological developments in the past ten years alone, we discover the tremendous impact upon our society of this unpredictable element. This is clearly demonstrated in a very interesting article in *Fortune* magazine for January 1959. They ran a chart on the scientific and technological triumphs of the 1950's. There were some 78 advancements in science and technology listed, and of these 24% were achieved sooner than expected. For example, a nuclear-powered submarine, satellites and video-tape recording coming along in 1956—well ahead of schedule as you well know. To point a finger at the advances that are being made it is interesting to note that video-tape recording may be on its way to being obsolete, in a sense, with the development of thermo-plastic tape or perhaps something else of which we are not yet aware. Tremendous advances are occurring very rapidly. Twenty-four percent of these technological and scientific advances came sooner than we expected, and 18% of these 78 advancements were totally unpredictiable. For example, the discovery of arousal mechanisms and reward centers in the brain, certain special electronic amplifiers and switches, and the tranquilizers.

Predicted during the 1960's is the machine translation of languages, a new family of ultra-high capacity cumputers, an understanding of the aging process, and mural television. I suspect that these all have some implications for education and some implications for the applications of the new educational media. What I might also ask is what the unpredictable 18% in the 1960's might be and what implications these might have for teaching media and teaching methods.

Rate of Research

As I look back over the research with instructional communication media during the past four years, it seems to me that there is a rather striking development. Where it took the motion picture film almost 25 years to break through an emphasis upon research that sought to compare its teaching effectiveness with more conventional teaching methods (the comparative effectiveness research), instructional television will probably accomplish this step in from six to seven years. And the teaching machine seems to be on the way to accomplishing the same feat in from two to three years. What I'm saying is this, that the time span for the acceptance of a new media of instruction, a period of justification if you will, is being shortened dramatically with each new discovery. We are rapidly moving from the challenge that is frequently thrown out to us, or has been in the past: "Prove to me that the new media will work:" to the request: "Tell me how can I best use it in education?" Now this is a tremendously significant point, and as I have visited in many places I have seen this emphasized over and over again.

Consumers of Research

I would like to turn now to five levels of consumers who have need for research knowledge. This is a classification that I think is a useful one as a background for discussion of the research. (See Figure 1.) We have the researchers at the top. These are the doers of research, and their needs are for unadulterated research studies and a knowledge of current ongoing studies. Next we have what we might call the audio-visual communication specialists. These include the practitioners who specialize in dealing with communication media and the producers of instructional materials, as well as those involved not only in audio-visual education, but also, television and teaching machine specialists. Their need for knowledge, I feel, is somewhat less than the researchers. Then we come to the administrators whose responsibility is for total educational programs. Administrators from the elementary principal to the university president might fall into this classification. Then the teachers—this group has always been put in the pay-off position. Here is where the research gets applied, and unless the research gets applied in the classroom, we have really only been spinning our wheels. Finally, the public. This body of people needs knowledge of research in a highly generalized form. The use of the media in education raises problems in the public's minds, and these questions need to be answered.

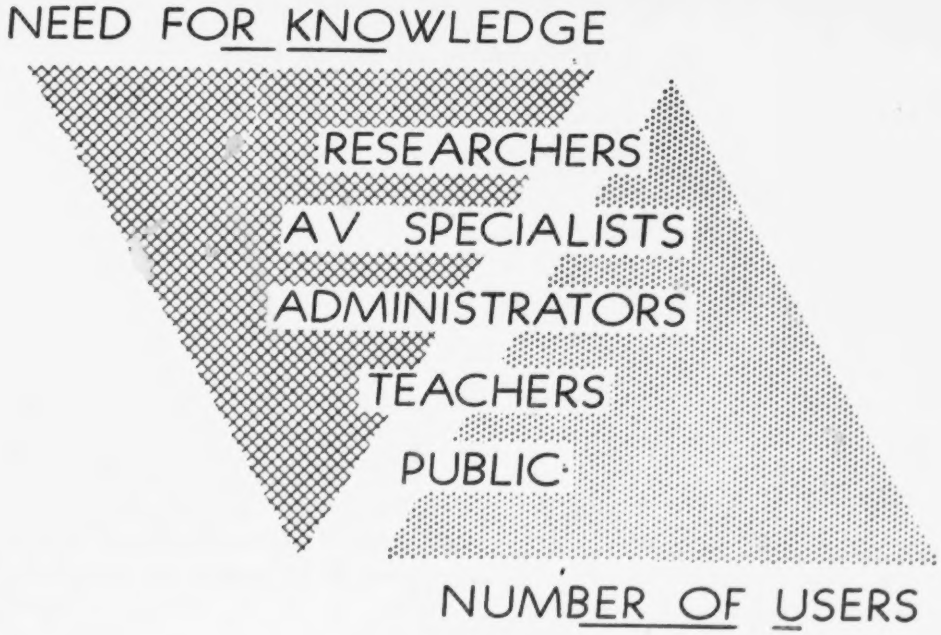

Figure 1.

The Number of Users

The second triangle, the one on the right (see figure 1), reveals an interesting thing, I think. As the need for research knowledge decreases, as shown in the left, the number of the users of this knowledge increases. So in a sense we have a requirement continually to distill and to generalize research information for greater and greater numbers of users, and it needs to be put, continually, in a form for practical application.

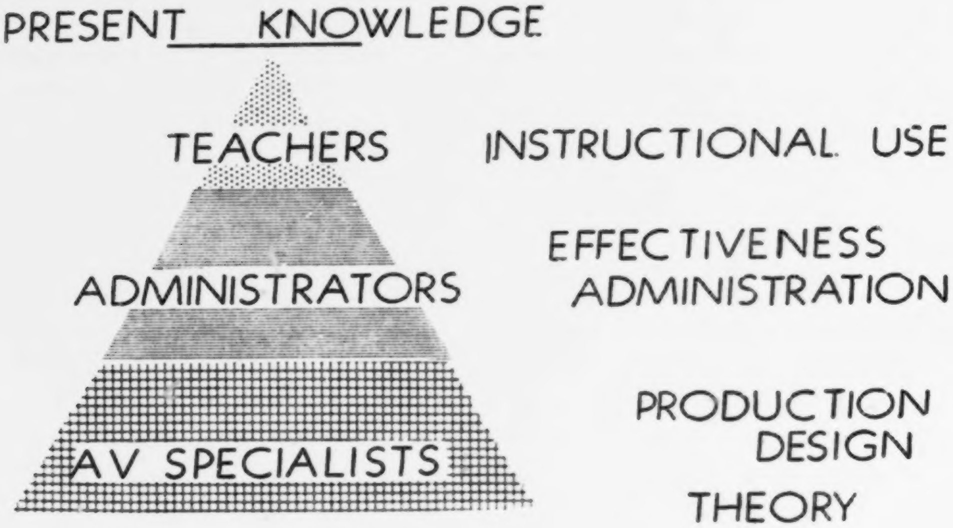

Figure 2.

Present Knowledge

Let us turn now to a second illustration (see figure 2). Let us consider the present state of our knowledge about communication media and their application, as related to three of these groups that we have just seen. We won't be concerned here with the research workers and with the public, because the public's research information needs are rather specialized, and I assume that the researchers will need all available research information. This is really a thumbnail, status report of what we know along some rather arbitrary dimensions. It is designed to give you an overview.

Use by Teachers

Let's look, first, at these uses of research by teachers. It seems to me that, basically, teachers need research information about the instructional use of materials. Now what do we know about this? We know that considerable research attention has been given to the techniques of using the new educational media in the classroom, the environmental conditions under which they are used, and the relationships of the learners to the use of these media. We know with a rather high degree of certainty that certain techniques of classroom use can add significantly to learning from these new media. For example, in specific terms, teacher introductions, preparation of the class for the learning materials to which they will be exposed, the use of student-participation techniques during instructional use of materials, class discussion, exposure of students to communication for the second time. A few studies have been made using motion picture films as teachers, rather than only as aids to teachers, and these studies show that learning measured under such conditions is as effective as conventional instruction. Certainly considerable television research has been conducted in this area.

In general, there has also been an inadequate study of the characteristics of the learning environment as it pertains to the use of the new media. However, we have some evidence regarding room-darkening, class-seating, and screen placement. We also know that class size probably does not significantly effect the learning of factual information from projected or television presentations under the conditions that have been measured. It is safe to say, also, that the effects of audio-visual instruction depend greatly upon the characteristics of the individuals and groups exposed to such communications. We can conclude that real research progress has been made in identifying some factors leading to the more effective utilization of the new media in the classroom. Although this generalization holds primarily for motion picture films, it can probably be transferred to other audio-visual media, including television, as well.

Use by Administrators

Let us look at the second of our areas, the administrators. First of all, it seems to me that there is a need and the administrator has a use for research information about the effectiveness of these media. This is an area where we actually have the greatest amount of research. It is assumed that the administrator needs also to have the research information possessed by the teacher.

It appears that any educational innovation must justify its claim. As a result, numbers of studies comparing the effectiveness of classroom methods have been conducted. We call these the comparative effectiveness studies and they have dominated the research since its beginnings. I pointed out earlier that this time lag in moving from these comparative-effectiveness studies to those that study the applications, the design, and the characteristics of different media is now shortening dramatically. In recent years, the motion picture film research has changed its direction to the more rewarding one of studying the characteristics within instructional films, variations in their use, and the relationships to learners, that can make them more effective teaching instruments. Television research is now beginning to demonstrate this sign of maturity, but, in general, is still characterized by studies of comparative effectiveness and, as we know, with a rather monotonous regularity of results.

Specifically, we know with a rather high degree of certainty that motion pictures can effectively teach factual information. Major findings from television studies are predominantly one of no significant difference between teaching by TV and conventional methods in typical teaching situations. Information learned by these media appears to be retained at least at well as that learned by conventional teaching methods. Filmstrips and slides apear to be at least as effective as motion pictures in teaching factual information, probably because they can be paced to students abilities and present opportunities for student participation. Inadequate research has been conducted with other media such as radio, recordings, still pictures, graphics, stereographs, and models.

Although there is less certainty regarding the degree to which the newer media can modify attitudes and opinions and motivations, we do have some evidence that motion pictures and television and radio can indeed influence these things. The newer media are effective teachers of perceptual motor skills of many kinds, being apparently as effective under certain conditions as conventional teaching methods. Although recordings, tape recorders, and television have been used extensively and effectively in teaching such verbal skills as foreign language, comparatively little research has been conducted in this area. The same thing is true of the teaching of the computational skills and in the developments of concepts.

Let us turn now to the research on administration. We lump teacher education in here as well. The research in the area of teacher education to utilize new educational media with maximum effectiveness is characterized by status studies and by questionnaire surveys. Practically no experimental research has been conducted on ways to train teachers either in college or universities or in in-service teacher education situations. As in the area of teacher education, the research in audio-visual administration is also barren of any substantial experimental studies administering school, city, county, state or college audio-visual programs. Some research in television, particularly at Pennsylvania State University is beginning to fill this gap and overcome this deficiency. Actually, the few reportable studies which have been made indicate that the most important factor in the success of an audio-visual communication program is the personal leadership of the program director. Although the use of some of the audio-visual media on a country-wide basis is inadequate, the situation is improving. Some guidelines are beginning to develop regarding the cost of instructional television.

Use by A-V Specialists

Let us turn next to the communication specialist. He has two research needs in addition to those listed above. He needs to be concerned with production design. There is considerable research available, and particularly that reported at Pennsylvania State University as part of their Instructional Film Research Program, and we know that certain improvements can be built into audio-visual instruction communications, particularly motion picture films, to increase their teaching value. Time limitations actually prevent a listing of the many variables studied and the specific generalizations that have resulted. There is a beginning, however, toward a set of guidelines that will help producers of the new educational media prepare instructional materials that will do a beter job of teaching. Although a start has been made to study some of the production variables unique to television presentations, there is much less research available.

In the area of theory, there exists a real need to develop a theoretical base for the entire educational communication field. Presence of this theoretical base is noticeable lacking from most research and from most of our textbooks on the new educational communication media.

Four Routes of AV Communication

I would like to make an additional observation about the research in the new media. We seem to be traveling down four routes in the instructional communication field. I think this is oversimplified, but I would say that, first, we are traveling the route of the printed textbook, perhaps characterized by the more traditional library concepts and the librarians. I feel that this is, possibly, a "verbally-oriented" route. Second, we are traveling the film-audio-visual materials route and our audio-visual people have an orientation toward "projected film," basically. We are also following a third route which is the television route. Here we have the educational telecasters and, I think, this is characterized by a production orientation. Finally, we are following the route of the teaching machine, and the proponents and developers of this device are the psychologists. I don't know how these people are oriented, presently it's kind of a "test" orientation, but I'm convinced that this will change.

So we have these four major new educational communication media advocates, each of them going, generally, his own route, each of them with his own followers. With rare exceptions, none of these groups is really communicating or cooperating with the others in the solution of educational problems. Each is approaching instruction from the chosen stance of his own medium. Only occasionally do we find anyone cutting across these media and attacking educational problems from the point of view of the requirements of the instructional problems themselves and the unique characteristics of the different media to solve it. Maybe this is too much to expect, and certainly I have no ready answer to the problem, but it seems to me that for the first time in our history, we have the essential ingredients for a workable system of instruction. First, we have human teachers. Second, we have an audio-visual and communication know-how from experience with conventional audio-visual materials and its potential, particularly in film and in television, to present an organized and paced presentation of information to groups of students. Third, we have the distributive and transmission potential of television. As Dr. Carpenter has said, it (television) may be characterized as a general medium through which the other instructional media may be channeled. And finally, and now, we have the teaching machine with its potential capability to provide guidance and control of the behavior of an individual student as he learns, much as a skilled tutor or coach would do. In short, I think that we have for the first time, the necessary technological elements, the human resources, and the knowledge of their instructional application for the development of instructional systems. We are lacking the materials, but they are coming mighty fast. We lack also the knowledge of how to integrate and to arrange and schedule these components in a proper mix to meet identified learning goals. Here I think we need research. I know, personally, of no Title VII project that even approaches the requirements of this particular problem.

Title VII Research

I would like to close by reviewing with you a chart that will show a classification of Title VII projects currently in progress. (See Table 1.) This was made as a visual classification for the guidance of the Advisory committee on the New Educational Media for use at its last meeting and it is only one kind of classification and a rather arbitrary and a mechanical one at that. It does represent one useful picture. We have in the vertical dimension, the media, and in the horizontal, the various areas of educational concern. This is a media-oriented presentation starting up at the top on the left and down the left column. The numbers in each cell indicate Title VII grants approved prior to the last October meeting of the Advisory Committee. If we take the media across the board in terms of these classifications, we see that there are some rather significant gaps in the research, and that our knowledge is not too great. The significant part in this classification is that there are not many studies investigating the use of media *in combination*. These projects approved certainly do not meet the requirement of a total application of the new media in some kind of system approach to teaching that utilizes all the characteristics of media.

In Table 1 we see that the television studies predominate, and

MEDIA COMPARISON OF NUMBER OF TITLE VII PROJECTS APPROVED THROUGH OCTOBER 1959

	Comparative Effectiveness	Classroom Use	Teacher Education	Administration	Production Design	Testing	TOTAL
Combined Media	11	2	4	1	1		19
Motion Pictures	9	2	3	1	4		19
Television	18	4	11	2	2		37
Video Tape Recording Kinescope	3		7				10
Self-Teaching Devices	7	3			3		13
Filmstrip-Slide	1		1		2	1	5
Flat Pictures	1						1
Recordings-Radio	4	1	3				8
Other Media	1						1
TOTAL	55	12	29	4	12	1	113

Table 1.

that there are large numbers of motion picture comparisons and a rather considerable number of those on self-teaching devices. Now when we look at the totals, we notice that some 55 of these comparisons are concerned with comparative effectiveness studies, that 12 are on classroom use, 29 in teacher education, 4 in administration, 12 in production design, and only 1 in testing. The blank spaces and the low numbers, of course, indicate where there are gaps and point up where some research might be needed. It might be safe to conclude that Title VII projects funded so far indicate need for more studies in administration, in production-design, and certainly in testing. We need also more attention to study of materials used in combination and to the more generally available media such as flat pictures, graphics, models, film strips, etc. These have hardly been touched either in the research in the past or the research now funded under Title VII. So I present this to you as a kind of quick look at where we stand with one kind of classification.

Another classification is now being made in which some other dimensions are going to be laid out in addition to the media dimensions, and some preliminary figures have been pulled together. In the content areas, science seems to be the subject matter most often studied, followed by teacher education, modern foreign language, social science, English, language arts, and mathematics. In the dimension of educational characteristics, there are 38 comparisons in college and universities, 26 in elementary schools, 18 in senior high school, only 4 in junior high school, and 7 at the adult level. Finally, some attempts are being made to determine the spread, distribution of studies, as summarized by educational objectives using Bloom's *Taxonomy of Educational Objectives* as a kind of guide. Some 66 comparisons involve the objective of teaching information and knowledge. Only 3 in conceptual development, 9 on problem-solving and critical thinking, 17 on attitudes and opinions, 9 in motivation and interest, 14 in applications of learning and 1 in motor skills.

Critique of Research

Dr. Lester F. Beck, Professor of Psychology, Portland State College and one of the "Field Readers" engaged by the Educational Media Branch of the U. S. Office of Education in evaluating research proposals, was given the very difficult and delicate task of making a critique of both Title VII proposals and current research in the new media. Deficiencies in proposals and on-going research are specifically identified.

First, Dr. Beck gives a brief overview of the points that a reader looks for in research proposals submitted under Title VII. By looking into these proposals he identifies some guidelines as to possible shortcomings or limitations in the thinking about research design. Next, he comments briefly on the new book, NEW TEACHING AIDS FOR THE AMERICAN CLASSROOM. *And, finally, he moves into a critique of new media research, as viewed by a person with his particular background.*

By LESTER F. BECK

THE RESEARCH proposals submitted under Title VII are reviewed first by the staff of the New Media Branch; then they are farmed out to 25 readers around the country. There are six main criteria prescribed by the New Media Branch for evaluating proposals:

1. Pertinence to Title VII.
2. Quality of research design.
3. Significance—new ideas.
4. Breadth of results.
5. Personnel and facilities.
6. Economic efficiency.

There have been some 600 propsals submitted thus far, and out of these 600, 85 have been approved for funding. This may sound like a pretty high attrition rate, but as we review the criteria you can see how some proposals virtually eliminate themselves.

Pertinence to Title VII. The Act itself, the National Defense Education Act—and specifically Title VII, says that the funds are for research and experimentation, in the areas of utilizing and adapting the new media, or training teachers to utilize the new media, or for presenting subject matter in new ways. There have been proposals where an individual asks for a grant simply to travel for personal gain, and this surely could not be construed as coming under Title VII. There also have been proposals to defray the expenses of a committee on a local campus, simply to get together and talk about whether or not they would like to use closed-circuit television on that particular campus. Again, we can see that this would not come under the provisions of Title VII which calls for research and experimentation.

Quality of Research Design. Another criterion is the research objective, the aims, the hypotheses, in the proposal. Are these clearly stated; are they well-defined? We find proposals with no research design built into them. An example is a one or two-day institute for teachers without evaluation. This is the sort of thing that a city or county would normally do as a part of its regular in-service training activities. Some have asked for funds to review films or tapes with the idea of purchasing these for the local library. Funds also have been asked for a consultant to move about the country to pep up the audio-visual directors. Naturally such proposals eliminate themselves.

With regard to research design we check the use of adequate controls, the level of statistical sophistication, the proposed treatment of data, and whether there is enough variation built into the research design to warrant the actual investigation. One excellent proposal came in, for instance, in connection with TV instruction in school subjects where the programs were going to be broadcast over a fairly wide area, relatively mountainous. This was to be a two-year project, yet, the amount of experimental broadcasting to be done over the two-year period was only 27 hours!

Significance—New Ideas. Another criterion is acquaintance with the research literature in relation to a given proposal. Are the ideas fresh and new or is this a warmed over project, something dredged up from the past for which the individual would like funds. There have been proposals where a school system wants to make motion pictures, or to have the students make motion pictures, as kind of an incentive device for classroom teaching. Here is an area, surely, where we have enough information already that we don't need further research. Nor do we need a comparison of gains from films and conventional teaching, television and conventional teaching.

Breadth of results. Are the results generalizable? Will the outcomes likely help others? Eyebrows have been raised on proposals that merely want to collect tapes for the local tape library, or get people together for an institute. The outcomes would be strictly local. Probably people have read Title V and Title VI, which provide for training institutes—in the one case counseling, and the other, foreign language teaching, and have confused them with the objectives of Title VII.

But with regard to generalizable results, here is a proposal from a Southern Negro college. The problem is to determine, first, if a perceptual differential obtains for undergraduate Negro students when reacting to audio-visual material depicting various groupings of ethnic subjects; second, if such differential is related to varying degrees of race awareness; and third, if gains in an American history unit, taught with visual aids, such as filmstrips, slides, etc. will differ if the pictures show (a) all Negroes, (b) all whites, and, (c) a balance of Negroes and whites. Surely this is a timely topic with vastly generalizable results and extremely interesting implications.

Personnel and facilities. Are the personnel and facilities adequate? How much equipment must be purchased? We have to look at this because there are tricks here. Some try to charge off depreciation too quickly. Only 20% depreciation allowance on equipment is allowed per year. Some projects seem aimed more towards procurement of equipment than research. Title VII does not provide for the purchase of television stations, or subsidizing the telephone company of a state for a year or more, unless these charges are an integral and essential part of a tight research design.

Also, there are proposals where obviously the individual is a contractor, a kind of middle man in research. He does not intend doing any of the research himself. He expects to take a cut and farm the project out. We don't get many of these anymore, but in the beginning there were quite a few five percenters or ten percenters testing Title VII.

Economic Efficiency. Is the budget reasonable? Can the project be done satisfactorily with the funds requested? How much fat, if any, is in the budget? More recently another question, indirectly related to the budget, has risen. How many similar projects are desirable? How much replication is needed to establish a given result? The field of video tape recording and playback for training is pretty active at the present time. Lots of projects are going on, and a project or proposal in this field would have to be pretty novel in its design to convince an evaluator that we need more in this particular area. There are, of course, new approaches that can be used, so that the area is not closed. Yet an evaluator will ask himself, Do we need another project in this area at the present time or can funds be better applied elsewhere on the new media?

Likewise, in using TV in teacher training, there are some excellent studies going on. Do we need additional ones now, or should we wait until the San Jose and sister projects are completed and see the outcome? The same can be said for teaching machines and prgramming for teaching machines. There have been a flood of requests recently for funds for programming in foreign languages, mathematics, psychology, social studies, and related fields. Can we say that we have enough projects going on to establish principles? If so, is it good use of research funds to support additional projects in this field? These are the kinds of questions that worry evaluators of proposals.

After the proposals have been read by the field evaluators, sometimes the readers are brought together in Washington to share their doubts and worries. Individual proposals are discussed and discrepancies in evaluation noted. This procedure helps the evaluator to check his standards and to return to the chore of evaluation with renewed courage.

Stanford Symposium Report

Now let's take a look at this fine, recent publication, *New Teaching Aids for the American Classroom.* The subtitle is *A Symposium on the State of Research in Instructional Television and Tutorial Machines.* To be sure, the title includes the phrase, *The American Classroom,* but the participants in this particular symposium are not talking to the classroom teacher, nor in some instances are they talking to you and me. This is primarily a document devoted to theory and design. The participants are C. R. Carpenter, Ernest Hilgard, Charles Hoban, J. H. Kanner, A. A. Lumsdaine, John Riley, Wilbur Schramm and Ralph Tyler.

What do these men say in this handbook? Dr. Tyler at the outset talks about the population explosion in the United States and some of the consequences of the increased birth rate, the change in employment profiles, and the fact that in education we have to emphasize flexibility in behavior. We are reminded that individuals no longer can be trained for a given job and expect to be in that job for the rest of their lives. Instead, they will shift from job to job as the employment picture changes. This demands flexibility. As we get more automation in industry, there will be a difference, too, in the kinds of jobs. People will have to be trained and retained, which implies that mass media will be very useful in this kind of rapid, continous education and re-education.

Dr. Hilgard reviews learning theory: reinforcement, conditioning, cognitive or gestalt, and personality theory in relation to the use or instructional media. He brings up to date a set of fourteen principles enunciated earlier.

Dr. Riley, a sociologist, speaks of innovation, difficulties of change, getting new things accepted, roles of people, parent-teacher-child roles, interaction, and group dynamics. This is more sociology than new media, yet the new media can be seen in the broad context of social interaction.

Stanford Study on Television

Dr. Schramm gives a glimpse of the research at Stanford on children who watch commercial television and the changes in the viewing habits of these children at 6, 10, and 14 years of age. He also presents some interesting information on the acceptance of educational television programs. The adolescents are rather scornful of educational television, but those who do watch have parents who speak well of educational television and watch it themselves.

Dr. Carpenter has a fine article on the systems approach to teaching and learning which he will probably tell us more about shortly. Dr. Hoban reviews the usable residue of educational film research and theory. I must go back and read Dr. Hoban's article again. It's filled with provocative ideas.

Dr. Kanner describes the development of teaching in the Armed Forces, while Dr. Lumsdaine speaks of advances in teaching machines and programmed self-instruction.

With regard to Dr. Lumsdaine's article, much of what he says here was published earlier in the*Audio-Visual Communication Review.* As a whole, the Stanford report presents high-level thinking about kinds of research, designs, and theory that are needed in the field of the new media.

Now let's return to a few of my own biases. In his article, Dr. Carpenter says that in the important field of communication research numerous programs were initiated, began to take root and show promise for a period, and then died. The Instructional Film Research Program at Pennsylvania State University is an example. Dr. Kanner follows a similar vein. What is regrettable, he says, is that the results of many studies on film are not reflected in the teaching films produced by the Armed Forces today. In other words, research findings have been disregarded by the educational film producer.

Communicating Results

I believe one reason why the researcher and producer haven't gotten together is that the research worker communicates in his jargon, in statistical reports, and the film producer doesn't learn from such sources. The film producer learns by looking at films, the same as the artist learns by studying masterpieces. If the research worker wants to influence production, then he must translate his findings into the film medium itself so the producer can comprehend easier what he's trying to say.

I am not nearly so pessimistic about the influence of the instructional film research program as others may be, because there is also a time-lag factor that has to be considered. If you look at the field of agriculture, or medicine, or education you can see that research findings are not immediately snapped up and applied. Take teaching machines as an example. We had the first prototype of the teaching machine in 1927. Thirty years later we woke up to the potential of automated instruction.

I think you will find that people now are going back and studying the early research on films with the idea of getting clues for the design of research projects involving educational television. The Minnesota project, for instance, funded under Title VII, reads very much like the film work done years ago at Pennsylvania State. Likewise, Kanner's comments on the Army's use of colored versus black and white television is an out-and-out duplication of what was done earlier with film.

Furthermore, much of the film activity in colleges and universities, the maintaining of production units, the establishment of departments of motion pictures, and the like, was given momentum by the research on films at Pennsylvania State University, in the Armed Services, and other places. So let's not sell our research efforts short merely because the results have not caused a revolution in the way films are made.

Changing Patterns

What is likely to happen in the future in the area of A-V research? For one thing, I believe we're going to have more diversified forms of measurement. The projects in the past have largely used objective tests of intelligence or achievement. This is like Pavlov recording drops of saliva to get information about conditioning. Pavlov never looked to see whether the dog's tail was wagging in the conditioning process. But tail-wagging—to know that a dog is friendly, may be much more significant to the survival of the world, than salivation. Likewise, I think we need to know what happens when that dog is returned to his littermates. Does he tend to become subordinate and passive as a result of going through this conditioning process? Or, on the contrary, having come in contact with an experimenter regularly, does he go back and become a leader in his dog community? Basing our judgments solely on saliva doesn't tell us much about the dog.

Let me give you a little example with humans of what diversified measurement can yield. At the University of Michigan, groups of students were taught by the lecture methods, and an interaction method, followed by objective tests and essay tests. The objective tests showed gains in achievement slightly in favor of the lecture method. The essay tests were analyzed by psychiatrists and clinical psychologists, who detected more feeling content from students taught by the interaction method, especially when these students reacted to a film on mental health. The objective tests didn't reveal this dimension at all. Thus, what appears to be superior with one form of measurement, may not be so with another.

We also need clearer definition of the teaching conditions under which research is done. We know what students, when evaluating films and textbooks, tend to evaluate them in the same terms as the teacher. If we get a rating of a teacher beforehand and the teacher says, "This is a poor film," or "This is a poor textbook," the students also tend to say this. If, however, the situation is restructured, the same film can come out with a different rating. So we must know the conditions of teaching, the attitudes of the teacher, the environment of the classroom; the whole context in which the teaching is done.

Needed: Longer Time Perspective

I also believe we need a longer time perspective of behavior. This need presently is a shortcoming of Title VII. Projects necessarily are limited to the duration of the Defense Act itself. In years to come we may want to do some reassessing of our subjects, and here is why:

Consider the Michigan study again. Those students taught by the lecture method tended (a) to rate the instructor higher, (b) to say they liked the course better, and (c) to do better on the objective tests than those taught by the interaction mehods. Also, those taught by the lecture method tended more often to go on and enroll in an addiional course in psychology the next year. So, on a two-year scale, you might say, the lecture method is paying dividends.

But recently they began checking to see where their majors came from and they found they tended to pick up more majors who had been taught by the interaction method. This raised a host of questions. Maybe students taught by the lecture method where the material is precise and well organized feel that all of the problems are solved. The students in the interaction classes may continue to worry about some of the unsettled problems they have discussed. They come back as majors three or four years later to resolve their feelings of a task incompleted.

In other words, a behavior perspective of one or two years may not be long enought to tell us what we want to know about psychology majors. We are finding very much the same thing in the factor analysis of tests. Time changes play a significant part in the structure or the organization of certain kinds of mental functions.

Expose Infants to Languages

Let me mention another aspect of behavior which will be delightful to follow when we have a long enough perspective. There is much emphasis now on language study, learning of languages—lots of proposals coming in this area. Remember the study done in the 30's by Professor Burt at Ohio State University with his growing son? Everyday for 15 minutes Dr. Burt came in and read Greek to his son, beginning at the age of 15 months. He read Greek couplets for 15 minutes over a period of 3 months, then he would change to a new group of couplets. He changed every 3 months until the child reached the age of 3 years. Then no more Greek was read to the boy until the boy was 8 years old, when Dr. Burt again read the original couplets that had been read to the boy in his crib, saying, "You have to learn these up to one errorless repetition." He had couplets, of comparable difficulty, which the child had never heard which he also had to learn up to one errorless repetition, in Greek.

Dr. Burt was able to demonstrate that those couplets which the boy had heard earlier, were learned with a saving of 25% over those that had not been heard. In other words, what had happened in infancy played a very important part in the child's later learning. This effect persisted to the age of 14 years, when there was still about a 10% saving.

The effects had finally disappeared by the age of 18 years. But this study has all kinds of implications. Perhaps we should begin playing foreign language records for our babies or ask for foreign language programs on TV and put the crib in front of the set for each program. The point is that by surrounding children early with the culture of learning we can contribute substantially to the progress later of the child in school.

Maybe, too when they do get into school, we should have something comparable to the International Geophysical Year in the field of languages, where on a national scale we get all of our magazines, all of our TV studios, all of our mass media to give a little time each day to the particular foreign language we choose as a national project. If we carry such an effort through from birth to high school, I think we'll begin to see then the remarkable learning that can take place in a broad social context, a learning which we miss now when we devote just a few minutes a day in the classroom to a particular subject.

Rat Research Yields Evidence

There is additional supporting evidence from white rats for the sort of thing Dr. Burt did with his boy. I shudder to mention rats here, but we do have some evidence of this kind: Two groups of rats were raised separately. One group has its cage prepared with circles and triangles. The other group grew up in a bare room. Later, as adults, the rats were given tasks of discriminating circles and triangles. Those raised in a wallpapered environment did significantly better than those raised in a barren room. In other words, the incidental things around the animal, or around the child can play an important part in subsequent learning. We can't get a perspective of the incidental things, however, if we limited our research to a day or a week. The effects of learning are long range and must be so studied.

Finally, we will want to know about the context of the learning *outside* the classroom, as well as in the classroom. Take Dr. Lumsdaine's fine research on television supported by teaching machines, or maybe teaching machines supported by television. When the child takes these machines home and the parent sees the child making progress on his own, we can expect some profound changes in attitudes toward learning and teaching. My hunch is that TV and machine teaching will lead to increased respect for schools. Parents will be more disposed to support whatever accelerates the learning and achievement of their child.

In summary, with regard to the research that's going on in the new media, we do need better communication of results; and Title VII is trying to provide this. It is especially important to communicate results in the particular medium of the audience that we are trying to influence. If we are trying to influence film producers, let's communicate with films. Then, I think we need more diversified measurement than most of the studies have used up to the present time. This is no criticism of present studies. We simply haven't set ourselves to the task of designing additional forms of measurement. We need clear definition of teaching aims and a careful description of classroom atmosphere. We need longer time samples, and we need to know more about the overall social context in which learning occurs.

Television

Dr. C. R. Carpenter, Director, Division of Academic Research and Services, Pennsylvania State University, was introduced as being in the "rather unique position of being able to speak about educational television with a very substantial amount of actual experience behind him." Dr. Carpenter's report is concerned, essentially, with the place of television research in education.

By C. R. CARPENTER

TEN YEARS have passed since the first systematic efforts were made to apply and evaluate television for military training purposes. This first research was done by the Special Devices Center of the Navy at Port Washington, Long Island. About eight years have passed since the Army and Air Force used television and, later, kinescopic recordings, as a means of teaching regular technical courses. About eight years have passed since the Ford Foundation, and especially the Fund for Adult Education, began to commit funds to encourage the widespread development and employment of television for informal education. Later the National Educational Television and Radio Center was established, first at Ann Arbor and then moved to Lincoln Center in New York. It is now being greatly expanded.

For six years now, the Fund for the Advancement of Education, another of the family of Fords, has supported an expanding array of projects and programs designed to employ and apply television to solve the problem of formal education in schools and colleges. Whereas the Fund for Adult Education group emphasized adult and informal education, The Fund for the Advancement of Education has been concerned with "in school" or "in college" uses of television. It is important to note that more than $32,500,000.00 has been spent by this Foundation directly, and also through the several funds, for these purposes. I'm not sure that this figure includes their international activities in the TV field. Recently, additional money has been set aside by the Fund for the Advancement of Education for the activation of some potential areas where educational television facilities can be adequately justified.

For approximately ten years, commercial networks and local television stations have made important contributions in funds, time and facilities to the development and distribution of informational and cultural programs. Recently, commercial networks, in cooperation with major industries, educational institutions, and foundations, discovered a new and prestigeful role for themselves by giving assistance in providing nationwide instructional programs, such as the Continental Classroom. I predict, with some confidence, that every national network will soon imitate the first of these continental classrooms. They have discovered that education is a prestige-building activity.

During this short period of ten years, forty-three educational stations have been brought into existence in the United States. These, complemented or supplemented by video tape, promise to become a fourth network spanning the country, which might be compared with the third network of the British Broadcasting System.

Equipment Needs

The Congress, by including Title VII in the National Defense Education Act of 1958, provided potentially 18 million dollars for research and developmental work on the new educational media, including television. This sum of money, which is substantial in comparison with the amount of money which was earlier available outside the military services, gives us a great opportunity and will be, in a sense, an investment. HR 10609, which has now cleared the House Committee on Interstate and Foreign Commerce, is before the House Rules Committee. If the bill is passed and signed into law by the President, it will provide $750,000.00 for each state, territory, and commonwealth for educational television installations. In addition it will provide up to $10,000.00 for engineering surveys for TV facilities. This opportunity to break through the barrier of lack of equipment in certain areas applies very directly to the cultural desert of Central Pennsylvania. I might also mention that Hawaii and Alaska may also take advantage of this opportunity because they are now included as states. Thus, assistance may become available for overcoming a critical lack of facilities, and for providing the means of developing, in breadth and in channel depth, a coverage for the country that we have not had.

During the past decade the development of educational television has been anchored to local and regional development—in universities such as the University of Houston, Iowa State, the University of North Carolina, and in states such as Alabama, Florida, Wisconsin, and Oregon. Other anchorages have been established in metropolitan areas such as Pittsburgh, Boston, Chicago, St. Louis and San Francisco. You have here, not something imposed from above on a nationwide basis, but rather the development of firm anchor points in certain parts of the country. One of the most imaginative developments in the planning stage is the proposal for the regional development of the South. This proposal, developed by engineers under John Ivy's supervision, calls for 205 million dollars to be spent in tying together the educational systems in the thirteen Southern states.

Television for Direct Teaching

Another major development has been the introduction of television into colleges, universities, and school systems as a means of direct academic teaching. This has been done by closed-circuit, by broadcast, and by a variety of combinations of equipment systems. You may find among the many patterns of operation now available, a pattern which might fit almost any of the situations in which educational television might be employed. For instance, if you want to look at a country-wide system, the Hagerstown model is in operation and is available for inspection. If you would like to look at a junior college system in the metropolitan region, the school board system in Chicago would be one that might be inspected. If you want to look at the use of closed-circuit television in a university, the systems at Penn State, Miami University, and a number of other places, might be observed. There are a variety of patterns, facilities, and activities already in existence which can be appraised, evaluated and perhaps copied.

The Place of TV Research in Education

The invention and technical developments of television were not made in response to educational needs, nor specifically for educational purposes. Basic discoveries in physics and electronics made television possible, and the struggles of war stimulated developments of the necessary technologies. Subsequently, the great communications industries and their subsidiaries developed television and made it part of the fabric of our dynamic culture. It was largely devoted to entertainment and to commercial purposes. The fundamental fact that very little of the television technology was specifically developed for purposes of education is something that needs to be noted. However, we might also note that there is growing interest in the equipment and electronics field for the designing and building of apparatus especially for education. The basic difficulty here is that of translating educational needs into equipment systems. I had a rather traumatic experience last year at Stevens College when a group of educators tried to talk with equipment specialists and architects. It was very obvious at that time that we did not have, and that we needed to develop, a means of communicating with the equipment specialists in order to have more appropriate, feasible and useful instruments in the future.

Emergencies in training and in education have led mainly to an interest in the development of the potentialities of television. This is true both in military organizations and in civilian institutions. For military training, there loomed through the fogs of cold war, even as early as 1948, the possibility of another conflict which, if it came, would come suddenly and would require the rapid and effective training of large numbers of men. Effective training, in some instances, meant very high level training. For education, there was a post-war emergency of the increased population of children and the related shortage of teachers and services for them. Thus, the mass media, including television, were viewed as a means of solving the problem of mass training and mass education. Accordingly, and quite logically, most of the research that has been done has been conducted for the purpose of answering the following questions: Can television be used effectively to train or teach rapidly large numbers of pupils, adults and trainees? If so, to what extent can it be used and for what areas of training and education? I'd like to call to your attention the fact that behavior which is based on reaction to an emergency or a crisis is not ideal. The ideal behavior is that of *purposive action,* which involves defining the problems, assessing the requirements for their solution, and then moving forthrightly toward their solution. There is a difference between a *reaction to an emergency* such as Sputnik and *purposive action* on our part. I say with some feeling that it is unjustifiable to shape the nature of what we do in education by reaction to an emergency rather than to take purposive action toward goals and purposes which we *are* capable of formulating.

Another prominent theme motivating action in the application of television to training and education, and one which is a backdoor entrance to the main problem, is the interest in television as a means of compensating for deficiencies. In military training, the foreseen deficiencies were lack of good instructors, inadequate numbers in case of a war emergency, lack of training equipment and instructional materials, and most importantly, the lack of time. In education, the known and anticipated deficiencies are a lack of good teachers, lack of adequate numbers and kinds of classrooms and other facilities, lack of academic space, and lack of funds. As a way of overcoming and compensating for these deficiencies, we became interested in television. This raises a very interesting problem. Shall we think of it as a supplementary activity? Are we concerned with the mass media, particularly television, as an auxiliary piece of apparatus or as a primary means of doing the job? A brief summary of the foregoing would be then, as a result of forseeable and actual emergencies, we have appropriated, not developed, television for training in education. We have attempted to use this mass medium to help perform a job of mass education and we have accepted television to compensate for deficiencies. We have expected it to meet certain requirements, commonly judged to be necessary, in order to do an educational job. We might well raise the question of whether or not we have properly assessed the requirements for doing certain modern jobs with modern tools at this time in an otherwise very advanced technological society.

By and large, but not exclusively, research has been used to collect evidence as the basis for judgments and decisions on whether or not television can be used, and how it can help to solve critical practical problems. The amount of funds for television research, for the decade 1950-60, which supports the use of television for training and education has probably not exceeded (exclusive of military figures) 10% of the direct cost of the TV projects or programs. Although this is a small portion of the total funds spent for television, it is a larger percent than is usually spent on new educational developments. For reasons not yet analyzed, research and experimentation has been a requirement and an expectancy for instructional television. As a result, research has been conducted in many places: in Navy, Army and Air Force projects (and I might observe here that in this situation, as in many others, the military have led the civilian developments); in colleges and universities such as Penn State, Montclair State Teachers College, New York University, Miami University, the University of Houston, Chicago Junior College, Case Institute, the University of Minnesota, the University of Iowa, San Francisco State College, the University of Oregon, and others; and in school systems such as Hagerstown, Philadelphia, Dade County in Florida, North Carolina, Detroit, Milwaukee, and an equal number of other school systems throughout the nation. I refer here, particularly, to the very extensive work of the National Program of the Fund for the Advancement of Education. The results of this research may not be critically, objectively, and fairly assessed until ten, fifteen, or twenty years from now, but the research *has* been done.

A series of reports have been prepared and are now mounting into the forties and fifties of specific kinds of reports on projects. An interesting thing to note here is where these reports have appeared. One might expect them to appear in professional journals, but, as a matter of fact, most of them related to the TV field, and particularly reports of projects sponsored by the Ford Foundation, have come out as special bulletins. This is to some degree unfortunate, because their distribution is limited. An important function of Section B, Title VII of the National Defense Education Act of 1958 might be to compile, summarize and make these reports widely available.

The kind and character of research which has been done on television has been determined by the kinds of questions that have been asked of it. Research on television has been operational, developmental, and applied. Some of it may be classified essentially as action research or research conducted in such a manner as to implement educational changes and to increase the acceptance of these changes. The population explosion has justified and motivated some of the research. The need for efficiency in education has been another motivation for many of the projects.

The Characteristics of Television Research

Research on television has dealt with problems in the area of relative effectiveness and appropriateness of procedures, patterns and applications, and in the area of the acceptability of television to such people as administrators, teachers, students. Also, a considerable number of studies have dealt with the question of feasibility, including cost studies. When compared with other educational research, research on educational television has been relatively rigorous and fairly well controlled. For example, the extremely difficult problem of setting up comparison groups when one is dealing with schools of a region, and randomizing schools in a closed circuit system as you randomize subjects, has been dealth with very well. Part of the credit for this accomplishment is due to Henry Dyer of the Educational Testing Service.

However, most TV research up until now must be classified as "molar research," that is, dealing with large patterns of variables rather than with single variables. This is a result of several factors: The kinds of questions which have been posed for answers; and the fact that studies of television have been done largely in the context of actual instruction and to the present state of the development of measurement and experimental design. Our most frustrating criticism of the Penn State research is that we didn't measure "the important things of education." However, we have developed the best kind of tests; we have used essay tests, we have used objective tests, we have used actual choice situations for measuring attitudes instead of paper and pencil instruments. Nevertheless, we are liable, as everyone else in the field seems to be, to the criticism that *we have not measured the immeasurable,* the qualitative, that which is never measured in education. We admit the difficulty of this problem, but it is a problem which faces education in general as well as the researcher with mass media.

Nevertheless, for purposes of providing information basic for making practical decisions, television research has yielded rather adequate information, more perhaps than will be used in the making of decisions. The practical school principal, superintendent, college or university president, provost or dean, school board of PTA member, now has available a sufficient body of information for deciding whether or not a school system or institution of higher education should undertake the use of any of the series of models of television operations which have been developed and put to rather severe practical tests. Much of the research that has been done might be termed model building and model testing. The interested educational administrator has the opportunity of selecting and making adequate adjustments of that model which best fits his own particular situational needs. He may study the model in detail, adapt it to the requirements of his own school system, university or college, to educational programs, or on an even wider basis. I have already mentioned some of these models. If you are interested, I am sure you can find other varieties. The Anaheim School situation is the one in the West that perhaps corresponds most closely with Hagerstown. There is little correspondence, it seems to me, between reading the results of research and actually seeing a situation, *live,* where all the pressures are operating. An administrator will find that research results which have come from this model building and model testing activity, have a high degree of transfer value for him. Television research has been mainly concerned with practical problems. It has not formulated general *theoretical* principles which have wide application. However, the model building and model testing approach may prove to have the desirable outcome of a satisfactory degree of generalization and applicability of results.

There is a vicious fashion in education which I would like to call to your atention. It is an unreasonable expectancy operating among educators which might be termed an *ad hoc fallacy.* The view holds that the proof of the effectiveness, the appropriateness, the acceptability and feasibility of an educational method, procedure, or equipment lies in the testing of it in each different course, each educational program and every school system or institution. The *ad hoc fallacy* sometimes reaches such limits of absurdity as to require that tests and proofs be made for each teacher and, I suppose eventually, for each pupil. This is not a profitable investment of energy and money. We should be able to make the judgment when the results of one particular project are reasonably transferrable to another. It is not profitable, furthermore, because experiments are rarely replication. There is a very strong tendency in educational research to do something just a little bit differently from the original experiment and to call this replication. If we are going to truly replicate, we must precisely control all conditions that existed in the experiment that is being checked. The *ad hoc fallacy* to which I referred is at the opposite extreme of the continuum of*the overgeneralization fallacy,* which is made when the results of one project or one experiment are overgeneralized and extended to inappropriate situations. I refer you to Hoban's rather difficult chapter in *New Teaching Aids for the American Classroom* for some further thinking along this line.

Research on instructional or educational television has been focused on means and methods of originating methods of instruction and presenting them both to students and adults. Research and evaluations have been ancillary to projects and programs planned to solve practical problems. Therefore, television research to this day has been directed more toward the evaluation of the strategy and tactics of education rather than toward the basic problems or the fundamental issues of education. It has not been directed enough toward the study of complex homogeneous factors such as motivation, perception, learning, communication processes, and the variables of social climates which affect the scholastic, academic and cultural development of those who would learn. It has not been directed toward the detailed systematic organization and programming of information for learning by television. It has been concerned too much with teachers and teaching, and not enough with students and learning.

About two weeks ago, I was at a conference at Rensselaer Polytechnic Institute. Six or eight very competent architects from all over the country met there and were concerned with a problem which might interest you. What would facilities in a university, particularly in an engineering college, be like if they were ideally designed and constructed to accommodate equipment and instrumentation which might now be available for use in education? This conference, like the one we are now in, was looking for a theme that architects could use to make decisions about what to include and what to omit. A general theme was suggested which seemed to put the problem into focus. *The fundamental general objective of education should be to increase, optimize, and extend the interactions of students with learning resources and learning opportunities.* Another, and complementary, principle stated was that in the design of facilities for education and educational activities it is important that interferences and distractions be eliminated. This may include machines, instruments, television, if you will, and people. I'd like to drive that point a little further home. If you look at a communications model, think of the possibility of putting information through channels and consider noise in the channels which tends to confuse or distort the information, I suspect you will find that you and I as teachers frequently generate more "noise" than information.

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The Role of TV Research

We made a beginning toward defining the role or place of research on instructional television. Its role has been cast largely into the form of the greatest possible practical use to educators. It provides information of value in making practical decisions. A general role of research *cannot be* that of making decisions and judgments. Research evidence on television merely serves to set limits to what can or cannot be done, or to define the range of risk involved in making practical decisions for action. The results of TV research aid in the definition of the general problem which will be encountered by all educators who use it; but these problems will need to be solved by the art, diplomacy, and skill of administrators and of cooperative group action. Experiments with television have served the function of introducing new energy into traditional educational systems and thus have disturbed the steady state, by permitting change, by stimulating new considerations, and by bringing into question traditionally sacred practices, rituals, and prejudices. Television research has played well the role of the *disruptive instigator of change,* but in education it remains to be seen if this result will be constructive and catalytic in effect.

Don Marquis from the University of Michigan visited the Penn State project a couple of years ago as a member on our panel of critics. We invited several other people, including Professor Ray at Illinois and Harry Newburn, and gave them completely free range. We said, "Look and see all that you can see. Talk to as many people as you wish, especially the critics of the Project. Talk to students; play the role of a student. Saturate yourself in this Project. Then write a brief constructive critique." Marquis made a significant remark to Milton Eisenhower. He said, "It's not television that is so important here; it's what television has done to stimulate concern about the improvement of teaching." This is what I mean by television's being a kind of new energy which disturbs the steady state. If we want growth and development, change and adaptation, we must sometimes look for irritants to disturb the steady state of education.

The functional role that has been abundantly demonstrated for television is that of extending instruction. This is the distributive, space-spanning function of television. The quantitative dimensions have been explored and estimated; the potentialities of television for improving the *qualitative* dimension of education are just beginning to be realized. Here, I think, lies the *great challenge* We are wasting our time now to be concerned with nonsignificant differences of results; what we must now be concerned with is breaking the quality barrier. I am not worried about numbers at Penn State. I *am* worried about the *concern* with numbers which will distract us from our full efforts to improve the quality of education.

General Results of TV Research

The task of reporting the results of research on television in the style of a review article is not appropriate here. I shall attempt to state for you several generalizations based on what I know of research results, in a form that may be most useful to you in this conference.

Comparative Effectiveness. Experiments which have controlled all variables in TV courses and *tested specifically the effects of televising instruction* have shown approximately equal learning with conventionally taught courses. Miami University has found some exceptions favoring conventional instruction, but I suspect that this result relates to the characteristics of the courses.

Experimentation in public schools, where considerable effort has been made to provide good instruction with superior teachers for televising to schools has been compared with conventional instruction using available teachers. The results indicate that significant and positive differencese occur, even with very large TV classes, and that these differences favor the *televised selected teacher patterns of teaching.* In these experiments teacher variables, television variables and class condition variables are compounded. Also, it should be observed that in school systems using broadcast instructional television, courses can be made available where they do not now exist. The alternatives here are not televised instruction versus conventional instruction but rather televised instruction versus *no* instruction.

Furthermore, it should be observed that poor schools may benefit more than good or superior schools by the tested patterns of televised instruction. The poor schools have more possibilities for gain.

In controlled experiments, the repetitive findings of no "significant differences" in the effectiveness of conventional and televised instruction has been based on a very wide sample of courses. The list of courses in which experiments have been done reads like a college catalogue or a high school course list. This finding should not be given the extreme interpretation that televised instruction is equally effective for all kinds of specific teaching-learning functions. Adequate work on the problem of defining specific teaching learning functions and of determing how television may relate to them has not yet been done systematically. There is a need for a taxonomy of learning and research on requirements for different kinds of specific learning.

Appropriateness. Exploratory work with instructional television has opened up a new field for development—the invention and adaptation of facilities, equipment, space, scheduling, and programming for instruction, and the presentation of instruction to learners. A great variety of experiments in this field have been tried, but many new use patterns and adaptations of courses remain to be explored. Television is not a monolithic technology. Whether viewed as equipment or as an operation, television can be made flexible and adaptable. It spans a great range of uses. Its programs can be almost as varied as all educational methods. Pointedly, I would like to emphasize that most of the present public stereotypes of television need corrections and change. There is a need for the definition of learning problems and the adaptation of TV to their specific solutions. We need an assessment of the functions which TV can serve most advantageously.

Acceptability. The acceptability of television depends on its proven and demonstrated effectiveness, its understood usefulness and other sound justifications. Acceptance depends on the assumptions, viewpoints, experiences, prejudices and amounts of information of people who react to television courses. The validity of these views needs to be carefully interpreted. Enduring acceptance will not be achieved by propaganda alone. Our objective should be to provide opportunities for people to assess fairly and objectively the merits and limitations of instructional television.

Generally, experiments have shown that acceptance increases with the duration of televised instruction's successful use. If the instruction is good or superior, even difficult and challenging, then acceptance increases; if instruction is poor or mediocre, then acceptance by both faculty and students decreases. Thus far the quality of teaching seems to be highly correlated with the competencies, characteristics and skills of the TV teacher. There are other determinants of quality which need to be explored.

Acceptance and support of television are highest where there are *clear and evident* educational needs which can be met better by using television than by other alternative ways of meeting these needs. At Penn State we have in our television system a large reserve of instructional resources which can be used when the demand requires it.

Feasibility. Teaching instruction has proven to be practical under a very wide range of circumstances and conditions. However, to be practical, the equipment and the complexity and scope of operations must be matched to the educational requirements of institutions and school systems.

Limiting factors to practicability can now be defined and anticipated, e.g. limitations of equipment systems, time scheduling requirements and the number of channels available for use.

We can now estimate the "break even point" of costs and productivity; thus operations *can* be made economically sound. However, there are known barriers to making the use of instructional television economically efficient. Ways of removing these barriers need to be developed.

Teaching Machines

Dr. Arthur A .Lumsdaine, Program Director, Training and Education, American Institute for Research and the principal investigator of a Title VII research project involving self-instructional devices and techniques, spoke both on the development of the devices and their current use. Because he employed many visual aids, his remarks are presented here in a slightly different form from his presentation at the conference.

By ARTHUR A. LUMSDAINE

MUCH of the the recent interest in techniques for individual self-instruction centers around the concept of what is usually called the teaching machine. The notion of a teaching machine by which Johnny might learn his spelling or calculus from an impersonal device instead of from a warm, friendly adult and usually, I guess, female human being, might bring sneers of incredulity from some, explanations of dismay or aggression from others, and cries of joy or at least hope from still others. Those who are initially incredulous or scornful are perhaps inclined to doubt that, even in an age in which electric computers can be programed to play a reasonably passable game of chess, any machine could possible teach or fulfill any of the teaching functions usually carried out by human teachers; they feel that a teacher's administrations are a *sine qua non* at every stage of the process if Johnny is to learn anything at all. Such individuals, who perhaps are not likely to count too many self-educated men among their group, often have little direct acquantance with teaching machines other than that gained from, perhaps, an occasional press story. When they acquire a little more knowledge, in my experience, they are likely to switch over to one of the other two camps, that is to say, either the hostile, or the enthusiastic.

Those whose reactions to the idea of teaching machines verge on the enthusiastic or hopeful may, or may not, know very much more about recent developments than do their fellows in the derisive or hostile contigents. They are probably very conscious, however, of the educational problems we face. They know that we are in competition with a rival nation that is devoting a major share of its assets to the education of its people and that, increasingly, is giving us a run for our money in technological and economics areas where that education is paying off. They know that we face, here in America, an acute shortage of teachers that is almost certain to become worse as time goes on, and perhaps they doubt, as I confess I do, that for all of its great and undisputed potential, educational television, airborne or otherwise, is the sole answer.

Those whose initial attitudes are hostile or dismayed may be thinking, first of all, of the spectre of technological unemployment for teachers. They may admit on reflection that it is, perhaps, a bit inconsistent to express this fear in one breath and to worry about a worsening shortage of teachers in the next breath. Still, the idea of using machines in our schools may suggest to them a dehumanizing mechanization of human values associated with democratic liberal education and may conjure up, perhaps, some vague form of regimented lockstep. I think that this kind of apprehension can be largely dissipated by looking at a few specific teaching machines and, in particular, at some of the kinds of material that they are designed to present.

The forerunner of present day teaching machines was envisaged quite awhile ago in the early 1920's by Sidney L. Pressey at Ohio State University. Pressey, looking at the classroom of that day, not too different from the ones we have today in many respects, was impressed by the time consumed with endless routine chores of quizzing, or scoring papers, and other repetitive tasks which not only failed often to give desirable, prompt knowledge of results to students, but unquestionably usurped a great proportion of the teacher's time which, he felt, could be spent better in more creative pursuits. If, Pressey argued, labor-savings devices are possible and acceptable in the office and the home, why not in the classroom. Out of this conception Pressey arrived at a couple of devices which served the purposes which he had in mind.[1]

The devices which Pressey developed share with all subsequent teaching machines, and with recently developed non-mechanical self-tutoring materials, certain interesting properties which psychologists and educators have long recognized, or at least given lip service to, as important in being conductive in effective learning. Three of these properties are: First, continuous active response is required by the student by answering questions or exercises. Second, the student is informed at once whether each response is correct. Third, unlike the devices which employ mass media, the student proceeds on an individual basis at his own rate

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[1] See four (4) articles by Pressey, Sidney L.:

"A Simple Apparatus Which Gives Tests and Scores—and Teaches." *School and Society* 23:373-76, 1926.

"A Machine for Automatic Teaching and Drill Material." *School and Society* 25:549-52, 1927.

"A Third and Fourth Contribution Toward the Coming 'Industrial Revolution' in Education." *School and Society* 36:668-72, 1932.

"Development and Appraisal of Devices Providing Immediate Automatic Scoring of Objective Tests and Cocomitant Self-Instruction." *The Journal of Psychology* 29:417-47, 1950.

Despite these potential advantages, teaching machines were not widely adopted during the two decades following Pressey's initial development. This may be partly because the times were not right for their acceptance. We had not yet become accustomed to movie projectors, television sets, language laboratories, and tape recorders as familiar classroom appurtences.

The real surge of interest that is becoming so widespread today derives, in large part, from two papers written by Professor B. F. Skinner of Harvard in 1954 and 1958. In my view, the most important difference between the recent approaches and the earlier approaches to teaching machine instruction is the concept of what can be called instructional programming. Pressey thought of his devices primarily as quizzing machines, as adjuncts to test and consolidate material that had been learned from lecture or textbook study. The current trend is to try to develop self-sufficient programs of instructional materials that can cover an entire block of subject matter rather than serving only as a minor adjunct or review for other instruction.

I shall try to describe, briefly, the general characteristic of most programmed materials that are currently being constructed, as I see them, and in doing this, I will for brevity and simplicity, confine my remarks to one approach, i.e., the approach associated, generally, with programmers who follow Dr. Skinner—rather than trying to cover also the intrinsic programming methods used by Crowder and his associates. These materials consist of carefully organized sequences of questions and answers. The same is true for the other approach. Each question and answer segment is usually called a "frame." The materials are designed so as to require that the student respond actively to each frame. He is then furnished with a correct answer that provides verification or correction of the response he has given to that frame. It is more frequently verification than correction since by proceeding to develop the subject matter in very small steps, the materials are designed to insure a high level of correct responding at all times. As the student progresses through the materials, he continues to subtly expand his repertoire of knowledge to the point where he is making very complex responses accurately and easily. And by experiencing regular rewards for making correct responses, the student is kept motivated and can learn difficult concepts easily and rapidly. Thus, goes the rationale. In this kind of step-by-step material, the student's response at each step of the program can afford a basis for revising it. This is an extremely important point. The assumption is that if very many students respond incorrectly, it is not the fault of the student, rather the fault of the programmer. He's left something out, he's failed to make something clear. When this is found to occur, the program is reworked, frames being revised, new ones being added, or inserted to provide more practice or to clarify points, which the student's responses showed were left obscure. This kind of capability, for point-by-point revisions, at each juncture where the student went astray in an initial program, gives the programmed form of instruction a great advantage over most other media such as films and conventional textbooks. For them we ordinlarily do not have a record of student progress each step of the way, and where, therefore, the opportunity for correction tends to be too little and too late. On experimental tests of the effectiveness of programmed spelling materials presented in a simple teaching machine, Dr. Douglas Porter found that the subject matter was taught much more effectively than by conventional methods and also in considerably less time.

We have developed in Pittsburgh, under a USOE Title VII project at the American Institute for Research, some materials to assess the contribution which self-instructional techniques can make to achievement in high school physics. In this case the materials were used in conjunction with televised Physics lessons in the EBF Harvey White series. Three thousand self-tutoring frames in Physics were written last fall by Dave Klaus of the American Institute for Research, and this spring they were being revised, reproduced and distributed to students in about fifteen high schools in the Pittsburgh area. The materials, as mentioned, have been used to complement the daily televised lessons in electricity and light of the Harvey White series, transmitted over Station WQED 5 days a week to all the participating classes. Results are now available based on comprehensive examinations covering this material, and an interim report on these findings has been prepared for the Office of Education. The test results for experimental classes to whom the self-instructional materials were made available were compared with those of control classes who also saw the televised Physics lessons but who did *not* receive the self-tutored materials. The tests demonstrate rather conclusively that the materials are, as we expected, making a very significant contribution to the average level of achievement by the students. This is true despite the fact that the student's use of the self-tutoring materials, although encouraged actively by the participating teachers, was voluntary rather than a mandatory course requirement. As one student told us, 'Gee, I never knew it could be so easy to learn Physics.

Directions for Theory in Audio-Visual Communications

Dr. James D. Finn, Professor of Education, University of Southern California, discussed the problems of theory in the general audio-visual communication field.

By JAMES D. FINN

WE HAVE heard two excellent reports on specific areas of instructional technology by Carpenter and Lumsdaine—television and teaching machines and possible combinations of these approaches. I suggest we now search for some kind of theoretical structure to bring together the various media.

Recent Growth of Instructional Technology

As a background for this search for theory, a very general account of the recent growth in instructional technology is illuminating. Consider Figure 3 which covers, very roughly, the last thirty years. Using the entire educational system as our sample, the development of instructional technology (the use of devices, materials and planned systems) was at a relatively low level from 1930 to

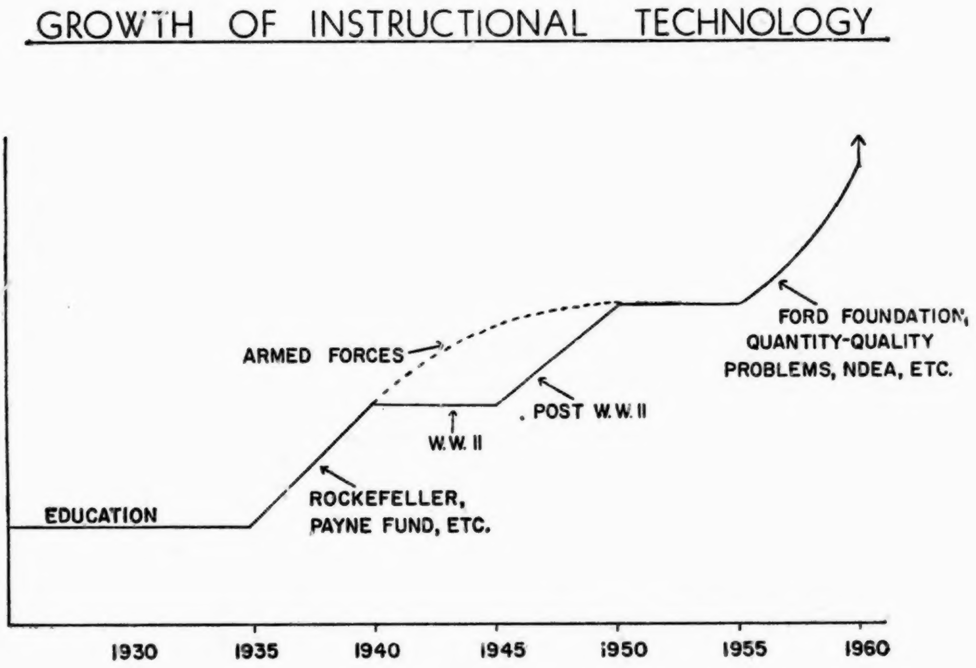

Figure 3.

1935. Between 1935 and 1940 and movement took a great sweep upward due principally to the research and development funds poured into it by the Rockefeller Foundation and the Payne Fund of New York, the attention given to it by a group of very talented men and the availability of better materials and machines. The work of this period had profound effects. For example, money granted by the Rockefeller Foundation created the famous Motion Picture Project of the American Council on Education which set the pattern for the use of audio-visual materials for the Armed Forces during World War II.

As with all educational activities, a slow-down occurred in instructional technology during the war and a lack of equipment, materials and audio-visual personnel set back the movement within education—or, at least, caused it to mark time. However, this same technology of instruction, as everyone knows, moved over into the areas of industrial and military training during the war. This move relied principally on the previous findings of the educational research and development activities of the thirties and succeeded brilliantly by supplying the necessary money and talent for successful implementation.

Following World War II, a great public (and some continuing military) interest developed in the use of audio-visual materials and, during most of the decade 1945-1955, another upsurge can be noticed as this technology was introduced into education with some force. Military sponsored research, principally at Pennsylvania State University, also continued.

However, the curve of the post-war growth of instructional technology began to level out between 1950 and 1955. At the same time (*circa* 1952-1953) another infusion occurred. It began with money and pressure from the Ford Foundation which was later supplemented by the National Defense Education Act with its attention to the new media of instruction, the national concern with problems of quality and quantity in education, etc. The curve of growth took a sharp turn upward about 1955 and has been continuing almost straight up ever since as, in addition to other forces, inventions, advances in educational psychology, new concepts of educational methodology and other developments have all made themselves felt. This background of growth is the base on which I should like to consider some aspects of the problem of a theory of instructional technology.

Aspects of a Theory of Instructional Technology

Any attempt to develop a comprehensive theory at this point in time could start at several points. We may identify these as, (1) a review of the status of current theory, (2) the recent attempts to create (and adapt) portions of communication theory as it is developing in the social sciences, (3) concepts surrounding the creative production of materials, and (4) concepts derived by analogy from science, technology and industrial development.

Beginning with the status of current theory, most audio-visual people ground their whole point of view on the concrete-abstract relationship in learning. This relationship has been stated several ways, but the most popular version of it is Dale's famous *Cone of Experience.* The Cone of Experience concept is a sophisticated statement of the old and much more immature sensory-realist position in education that was popular about the turn of the century. As many of you know, with additional knowledge, this position has come under increasing scrutiny and criticism, particularly by Gerbner and McLuhan. The basic question of what is real to the student remains important, but the artificial distinctions between pictorial reality and verbal reality have been questioned as have the step-by-step organization of this reality when interaction seems to be the key.

Other aspects of current theory include the so-called variety of materials approach to learning—a derivation of the cone of experience concept and one which seems to be very sound. This is often coupled with the usual kind of hortatory admonition to be found in curriculum books regarding utilization of the materials in the classroom, motivation, etc. These statements, for the most part are derivative from classical educational psychology which emphasizes individual differences and individual approaches to learning.

This does not, of course, represent all of current theory. For example, Exton's concept of optimum synthesis would belong here. Even this idea, however, is not a part of the theoretical equipment of many a-v workers. There is nothing particularly wrong with such a theoretical base, but most researchers, at least, feel that this base is too narrow and does not offer enough in the way of explanation and/or hypothesis development.

In the meantime, during the last fifteen or twenty years, social psychology and its allied fields have been developing communication theory. It has been obvious for some time now that communication theory has much to offer those interested in the new media. Central to much of communication theory is the so-called communication model which was first developed to govern telephone switching systems. Later the original model was worked over to involve human communication—with each model, such as those developed by Schramm and Gerbner, getting more complicated. Related to this has been work like that of Hovland and his associates in communication and persuasion, work in the field of psychiatric communications, etc. There have even been recent attempts to relate value theory to communication in terms of such questions as, what kind of values are we transmitting?

This general area of social psychology and communication with its related work still offers much to those who wish to understand the effects of the new media as instruments of education. One of our pressing needs is a further development of this field.

Another, almost entirely neglected aspect of theory which, if developed, might help us solve many problems is the third category—the creative productions of materials. What distinguishes a good film or television presentation from a bad one? What is involved in a truly creative production? These questions, of course, are not exclusively educational questions, but they certainly apply to educational productions as well as to any others. Here the work of Lester Beck and Robert Wagner, particularly statements of the problems of design in exposition, could provide leads for needed theoretical development.

The fourth possible starting point involves consideration of concepts derived from analogy with science, technology and industrial development. I should emphasize that there are, obviously, more than four. For example, learning theory is another possibility. Such terms as entropy, feedback systems and efficiency have been heard. Eventually, a complete theoretical structure for the new media field will probably combine elements from the four areas I have cited and several others. In the meantime, this newer analogical reasoning from technological concepts interests me and I would like to suggest a couple of ideas that seem to be quite fruitful. Particularly, I would like to deal with the concept of entropy.

Entropy in the Educational Universe

In a basic paper which I have done recently[1], this concept was referred to briefly and I would like to expand the idea somewhat at this time.

(It should be noted for the record that Professor Slabaugh of the Department of Chemistry of Oregon State College took exception to the analogical reasoning which appears in the next few paragraphs.)

Now, it is my theory that the *educational universe,* and this term might apply to a local school system, a county, or a state department, is pretty randomly organized. In a given school, for example, with 15 teachers in it, their curriculum approaches, for the most part, are fairly randomly organized. This is a characteristic, in physics, or a low energy system that has what is called high entropy. The only thing you need to realize out of this, at the moment, is that this term means a low level of organization, namely that things are randomly distributed for the most part. Now, what has been happening in American education is that thrusting into this educational universe (or these educational universes) has been instructional technology, which, in effect, is energy entering the system. Some sources for this energy, and there are many others, are the Ford Foundation, the NDEA, economic pressure, and the fact that we live in the middle of a technological society. Now, when that happens, then the analogous law in physics is applicable here, the educational universe becomes a high energy system. It attains a state of negative entropy[2], which means simply that it has a high level of organization.

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[1] Finn, James D., "Technology and the Instructional Process," *Audio-Visual Communication Review,* Vol. 8, No. 1: 5-26, 1960.

Let me illustrate this proposition, which is a very general idea, with some specifics. Dr. Shank's program in CCTV at Anaheim was very much like every other elementary school district in that part of Southern California. Suddenly thrust into that system was closed-circuit television. Dr. Shanks would be the first to admit that the Anaheim district became much less randomly organized almost overnight, achieving a much higher degree of organization. He talked about scope and sequence in his curriculum. Now he always had a certain amount of scope and sequence but it's now laid out in detail. They have this teacher education program every week. The principals are given a form which somebody has to write out and which says you will do this before the telecast, the teachers watch the telecast and after this you will discuss so and so. This is high organization, a piling up of energy because it takes a lot of work, in the traditional physical sense of energy, to put this program together. In effect, the Anaheim system is more highly programmed.

It is my theory, and the thing I think we ought to investigate, that any time you introduce technology on any scale—if you bought, for example, 50 or 100 overhead projectors and introduced them suddenly into a school system and attempted to use them correctly, you would have a high level of organization follow automatically or the program would fall apart. And furthermore, there is a corallory to this my engineer friends tell me, in that you can introduce so much energy you can upset the apple cart. However, given an upper limit, you will automatically get a high organization level with the introduction of energy.

Now consider this theory at the classroom level. You decide to use the Harvey White films, let us say, in a given classroom. What does the teacher have to do, introducing all that technology? He must have a much higher level of organization within his class because because he has introduced a great deal of energy into the system.

Now let's see what some of the other implications are. I am not one that is convinced that any of this instructional technology is going to save any money in the dollar sense. I understand that there are people who will think it will. Maybe it will, but I don't think it can be proved by industrial example or anything else, that if you do a good job with these communication materials, you are going to reduce costs. Let me put it this way. I'm sure it costs more to make a Boeing 707 than those old twin motor jobs in which I used to travel from Greeley, Colorado to Montana in 1938. And the same thing, I think, is going to happen in the educational universe. We will get increased efficiency—this is where we save money. And we have efficiency problems, not cost problems.

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[2] The concept of negative entropy was the crux of the controversy with Professor Slagaugh. This is a concept of Norbert Wiener's and may be found in his *Cybernetics* and *The Human Use of Human Beings.* Actually, the result of the sign is a mathematical convention since, if the original equations were solved without sign reversal, entropy would be negative. Wiener uses the term (and the mathematic symbols) to signify a high level of organization within certain specific "enclaves" of the universe.

We will need more technical personnel without doubt. Introduce these overhead projectors in quantity into one small educational universe, and you have got to have somebody make the transparencies. We will deal with larger educational units. Look at the introduction of the airborn television project covering five states in the Midwest where the airplanes are going to fly around and transmit television signals to the ground over a radius of 250 miles. Those five states are going to have to organize the school districts to fit and they are going to have a higher level of organization. I think, also, that one of the implications of all of this, and a lot of people don't like to think about it, is that a higher organization will imply a national curriculum. There are a lot of pressures for a national curriculum and this is one of them. Now we have two, three, four or five national curricula, but the very introduction of this kind of a system of technology, as a whole, will push vigorously in the direction of a national curriculum.

There will be greater professional demands, if you accept this thesis. Consider the design engineer in industry today. Consider Art Lumsdaine and Ray Carpenter as comparable in function. These people are killing themselves with work, so is Walter Stone, so are a lot of you. Why? In order to make the system work. Now, the engineer and the executive manager in industry is killing himself so that a lot of guys can go bowling, drink beer, work 25-30 hours a week and push buttons. Some of these people actually work hard, but back of them is a professional staff which, by its very nature, is killing itself—ulcers, heart attacks, etc. I'm not saying that this is going to happen to all of the audio-visual and curriculum people, but this type of demand on the profession is inevitable, if you accept my thesis.

Also, you have a problem of built-in obsolescence. Art Lumsdaine has 3,000 frames in a programmed textbook system in physics. There is an obsolescence factor that is operating against him. Assuming, let us say, that physicists change the concept of static electricity slightly, and Art has a real serious problem. Now the textbook was bad enough. A town in Nebraska, I recall, years ago finally got rid of the arithmetic textbook, the same one they had used for twenty-six years. They had problems with horses and wagons and the people in Nebraska had automobiles by them. In a system of modern instructional technology, you are dealing with rather costly elements and the program of obsolescense is inevitable and difficult.

Finally, any such energy concept as this implies the development of systems. This is another aspect of the theory of technology which we have to face. We have two kinds of instructional technology existing today. We have that which is principally devoted to mass distribution—films, tv, the overhead projector, and many other devices that are designed to distribute data and information to large groups. We also have been developing as Dr. Lumsdaine has indicated the technology of individual instruction. In addition to the teaching machines with response mechanisms, you have individual viewers, and all sorts of listening equipment of the language laboratory type. Both the mass and individual technologies have been proceeding more or less in parallel lines until recently. Back in 1903, roughly, we find individual instructional technology in the form of the old Keystone View Stereograph sets. However, there was little else to compare with a more highly developed mass technology. About 1925, the Eastman teaching films in mass technology and Pressey with the individual machine technology both started *parallel* development. Today this parallel development is beginning to merge. What is happening is that researchers are combining mass and individual instructional technology. Research is beginning at Penn State under Dr. Ray Carpenter in this area. Dr. Lumsdaine's project is a combination. He has mass technology in the Harvey White films combined with individual technology in his programmed textbook. Dr. Robert Corrigan's invention of the Teletest system ties television in so that *individuals* can use it.

A third element, let us just call it, all other kinds of instructional processes is being joined with the individual and mass technologies. It is inevitable that these three will be combined as you build up energy systems into a total instructional system. This is what is happening in physics today. The MIT group, with the expenditure of millions of dollars—and they are not through yet, have developed, first of all, a new textbook in physics which contains a lot of new concepts. They have revised the basic content. But they did not leave it there. They published paperback books to go with it—Galileo, Isaac Newton, soap bubbles and all sorts of things. These are to be combined with 80 motion pictures eventually. Other elements include a manual of experiments for the student tied in with the book, an experimental apparatus manual (how to build apparatus not available) even some of the apparatus, filmstrips and tapes. All of these elements are to be programmed in a teacher's manual, and it is expected that the manual will be followed. This is an instructional *system.*

I think such systemization eventually is what is going to happen to some of our instruction. We can involve many elements into what I call a black box system. We may come to a theory which will devise us a series of "blackboxes" for mass data presentation, individual and small group automated teaching or self-instruction, phases of human interaction (teacher to student counseling, socio-drama, group work of all kinds), individual study and what I call creative periods, where a child paints or composes or solves a problem of his own. Somehow, somebody, someday is going to figure out how to put these things together into a fairly useful order of instruction to solve specific problems. There are feedback problems involved here, evaluation problems, all kinds of wires that have to flow between our blackboxes, and we have to make all kinds of decisions. This, I think, is the inevitable result of the introduction of energy into our educational system. Now, if this is true, I'll leave you with this questions. Who is going to do it?

part 3.

Needed New Media Research

Overview

The program of the conference had listed Dr. Wilbur Schramm, Director, Institute for Communication Research, Stanford University, to serve as Chairman of a panel to lead a general discussion on NEEDED RESEARCH IN THE NEW MEDIA. *Dr. Schramm was unable to attend the conference and Dr. C. R. Carpenter, Director, Division of Academic Research and Services, Pennsylvania State University, substituted for him. The following is quoted from Dr. Carpenter's remarks.*

By C. R. CARPENTER

I HAVE a feeling that this group of people is enormously powerful in relation to the kinds of problems with which we are all concerned. By taking some readings here from time to time, I have discovered that this audience is also extremely varied. In the first place, you have tremendously varied responsibilities in your own institutions and local situations. ou have varied problems that are pressing for solution. On the other extreme, there are some of you who are interested in research design, research variables, meticulously controlled research. There is great variation in levels of interests, in breadths of concern, and types of involvements. Furthermore, you are the people who have the responsibility for doing something about not only the issues of education but also the interaction of these issues with a burgeoning technology. My concern at the moment is to see that this discussion is raised to a high and challenging level.

We are not here to be entertained, and I don't care if I please or displease you with what I say. I had rather irritate you, provoke you, perhaps even cause some autonomic nervous system overflow, than to send you away from this session saying we had a "pleasant" time. This reminds me of a basic problem to which Title VII might well be directed, the problem of estimating and evaluating the effectiveness of a conference such as this. Since we talk about measuring almost everything else, why don't we measure what happens in the interactional processes that go on in a conference?

I might suggest, also, that although this conference's specific concern is with Title VII, Title VII is a pretty limited universe. I would like to see some spillover from Title VII consederations into the broad areas of sources of funds and possibilities for long range research.

It is my very uncertain task to substitute for Bill Schramm. I have tried to imagine what Bill Schramm might say. In the first place, although I have my own speech impediment, I don't have the same kinds of charming speech characteristics that Bill Schramm has, and I cannot immitate them. I am going to try to play the kind of role that Bill Schramm would play, were he here. If I miss the mark by 60% I will still have a good batting average. I shall only talk for three or four minutes because Bill Schramm usually talks briefly.

In the first place, I think that Bill Schramm would say that we need to begin taking some risks, to get rid of our conservative, safe, pleasant kinds of lives and attempt to take some risks in doing new and different kinds of research, perhaps more difficult research than we have ever done before. I would suggest that Bill Schramm would emphasize that we need to get out of our laboratories and into situations where people live. In laboratories we are dealing with specific variables that have to do with the molar realities of human behavior. I suspect that he would talk about the complex implications of Title VII and their significance for the communications field in general. He would possibly state some of his favorite theories on the communication processes and how they can be regulated.

I think that Bill, with his broad perspective of the communication field, would say something that I haven't yet heard at this conference; that is, I think he would talk about the implications of what we are doing here for the international level of communications. He would be concerned with what we do, for instance, in relation to the developing countries where he has traveled and been a consultant. He is just back from a trip to Bangkok, Thailand, where he was concerned with the communications problems of Indonesia, Malaya, Thailand, and Indochina vis-a-vis the Soviet Union. He was telling me in New York the other day of the fantastically strong team of people sent there by the Soviets to try to influence the pattern of the television and journalism in these developing areas. I think that we might free ourselves a little bit from a culture-bound type of thinking, and see some of the implications for other countries. Bill Schramm is really not a "new media" man. Hence, he would also talk about print, and more particularly in our context, he would be concerned with the textbook. He would lament, I think, the fact that although there is considerable research in certain of the "new" media and mass media, there is a deplorable lack of a corresponding research on textbooks.

At a recent meeting of the textbook publishers in Philadelphia, this situation was clearly recognized. I know of no instance in which multiple versions of a text have been experimentally tested out for comparative effectiveness; and textbooks, we should note, are mass media although they are not "new."

I think that Bill Schramm, in relation to his recent research on the reactions of children to educational television from the elementary grades through the secondary level, would emphasize the point that the "image" that is being built by the patterns of television communication is probably jeopardizing the potentialities of instructional and educational television by creating a negative kind of "image" for television as a source of learning. I think that this is a serious problem that we need to come to grips with as a major national issue. Particularly the representatives from the commercial television field ought to recognize the derived effects of the extensive television viewing of the kinds of programs that are most popular. These effects modify the potentials of television, closed-circuit and broadcast, in relation to television as a source of learning. The "entertainment set" which we have found ten years ago in relation to film is now developing in the television field. You have now a less favorable set of attitude structures or attitude systems on the part of young people toward television than we had six years ago when we started experimentation. Schramm would be quite concerned, not only with television in the school, but also with the total impact of television as it affects the cultural and educational levels and possibilities in our society.

He would certainly point out, also, the need for more audience studies to determine who is communicating to whom, with what affect. He would be concerned with the analysis of different segments of the listening populations, with how to reach the people whom you want to reach, and how to gain and hold their attention. He might, for example, although I am not sure this would be the case, point out that credit courses usually have a fantastically low and impractical enrollment. What can be done about this? If we are going to use broadcast television for credit courses, the low enrollment is a major problem, and he might point to this as a possible area of research.

Schramm, who has had administrative responsibilities, would probably point out the complex patterns of administration that are involved in the intervention of new kinds of technology into institutions. If so, he certainly would be touching one of the factors which Lewin has called the "gatekeepers to social change" in an institution. I am talking about an institution now as either a college, university, or a school system. Certainly, responsibility for directing change lies within various administrative levels. This is particularly true in the public school system, where the ones given by administrators to teachers importantly determine the patterns of teacher activity. It is less true in the chaotic situation of higher education in which every individual acts as his own master.

Now, I want to challenge Lester Beck's evaluation of the Stanford Symposium as "a high level discourse to ourselves." I would like to characterize the Symposium as a discourse of extreme uncertainty. We did not know what we were saying to what effect, but we were taking risks and trying to think daringly. We were trying to work toward the forefront of the kinds of new research that might be done five, ten, or fifteen years from now. It is in this spirit—one of risk and adventure, of challenge and creativity—that I sugest we work in this conference.

Television

I have repeatedly emphasized the judgment that television research thus far has been conducted to answer practical questions and to provide information for making decisions about the practical uses of television in education. Until now the Department of Defense, industries and foundations mainly have sponsored applied research. Title VII of the National Defense Education Act provides the possibilities for new and broadened emphasis on theoretical research. Opportunities now exist for a widened range of work on the "new" media as well as on basic problems of education.

What is needed now for research on instructional television is also needed *for education generally*. Research on television has pointed again and again to unsolved basic problems of education and more specifically to the unknown and the untried in the fundamental areas of teaching-and-learning. We need *research in depth*. We need the kind of research which will yield results that can be formulated in terms of general principles. We need research oriented both *from* and *toward* theoretical systems. We need to create conditions and provide the means for intermediately basic experimentation in order to provide a flow of new concepts for application and testing. We need to provide an optimum of protection for research men from the pressures, demands, and viscissitudes of insistant practical requirements. In brief, we need in this country, and we cannot afford not to have, an adequate number of permanent Experimental Research Centers or Institutes suitably equipped and adequately staffed for attacking problems which are basic to learning and to the academic development of students. We need to apply systematically all that we know about motivation and learning. We may well find that only when these steps are taken will it be possible to pierce the *quality barriers* which confront us, not only in the area of instructional television but also in other areas of education.

We need, in addition, dispersed nation-wide efforts in project research in reasonable balance with permanent centers. These regional centers could be the focus of both advanced training and advanced research. They, like the present Title VII efforts, would exist for the purpose of achieving high levels of excellence in education.

Larger Research Patterns

Dr. William H. Allen, Director of Research, Department of Cinema, University of California, another member of the panel to discuss Needed Research in the New Media *stated:*

By WILLIAM H. ALLEN

I'D LIKE to make four points relative to what I consider to be some important broad research considerations. First, I think we need to avoid the duplication of previous research of certain kinds. As I stated earlier there has been ample evidence, for example, regarding the effectiveness of both television and motion picture films compared with conventional instructional techniques. A number of large-scale television studies, in recent years, have devoted almost their total effort to research of this kind. It would appear to me to be wasteful to continue these comparative effectiveness studies, except under special conditions.

Second, I think we need to consider research using combinations of media as parts of total instructional systems. We need to encourage this. Let me say further, that in the past we have studied media in isolation, not in combination, and this has been especially true of television and film research. It is true, now, of the teaching machine. Because of the probability that different media make different contributions to learning, we would expect more fruitful results from their use in combinations and as parts of learning systems. Where appropriate, it would appear desirable to bring to bear all possible combinations of media to solve instructional problems.

Third, I feel that we need research that studies broad educational problems, total segments of the curriculum, and total educational systems, on the assumption that the use of these newer instructional media will improve education and instruction. It seems imperative that they be applied on a scale that has the capability of bringing about a major change in our educational system. This means for example that they might be integrated into the teaching of science, mathematics or modern foreign languages, across all the grades, or be applied to such problems as the teaching of the gifted child or the instruction of critical subjects in the very small high school, as examples. An attempt should be made to discover their contribution when totally incorporated into all instructional elements of a single school system or institution.

Finally and fourth, I feel that we need large-scale programs of research. Now we're doing bit-and-piece research. We have the dissertation approach to our research. What we really need are large-scale research programs, probably in centers. We have a shadowing of this kind of research at Penn State, the Air Force, the Army and the Fund for the Advancement of Education. These have been large-scale programs, and they are resulting in promising leads that can be followed up. Out of such centers as these centers I think we can get demonstrations of use and application on a very large scale. I think, out of these, also, that we can get very high professional and public visibility for the research that we're conducting and for its application in education.

General Issues

Dr. Lester Beck, Professor of Psychology, Portland State College, was also a member of the panel, but he chose to forgo his remarks and invite a general discussion of the topics related to new media research. The questions raised and the answers presented are summarized below.

Q. What is the climate of faculty resistance and faculty acceptance to experimentation in television.

A. (C. R. Carpenter)
At Penn State we are in our 6th year. The peak of the number of student credit courses was reached year before last. It is now lower that it was year before last. Whether or not this is a function of faculty resistance and acceptance is not exactly clear. We do know certain areas where there is no question about the use of closed circuit television. Now interestingly enough, these are areas where there are difficult courses—biology, analytic geometry, German, accounting and such courses. The courses that have developed the most difficulty among the peers of the TV teachers are in the departments of sociology, psychology, and economics. One of the two reasons why TV teachers didn't continue is the enormous responsibility. They get tired carrying the load after awhile unless it is rotated and shared with someone else. The other is lack of support. They can tolerate just so much sniping and criticism and lack of support, and they say to hell with it.

A recent assessment tended to show that we have about 25% of the faculty who are positive toward television. Ten or fifteen percent would be very positive, willing to use it in their departments. There is a large neutral group, and the neutral group tends to increase at Penn State because we don't make much of closed television, this in not a live, hot issue. The live. hot issues are ones of salaries, promotions, security, etc. As television interacts with this, there may be some effect. As you may begin to see, this is not a simple story. We have 10 to 15% of the total faculty who are negative, and they do everything they can to throw blocks in the way of this particular development. The administration is pretty well in support of it, but the actual central planning for the institution does not realistically incorporate either the use of the new media or other teaching resources and materials. It is in the plan but it doesn't get built into the budget, the physical plant, or the supporting personnel. Here is where an administrator can play an enormously important role. As putting something in words, in a plan, doesn't reflect commitment to put this into an institution for use. Now, I've answered this in a long way because it's not a simple situation. We have two complete systems operating and we are putting in a third this month. We will put in a fourth as soon as a new building is built. In other words, we are building to complete a community network so that we can move information from any building where we need it to any other building. The problem of moving information instead of moving people, becomes a very real and practical one.

Q. Because of the way Title VII is written, is it possible to get support for projects which are basically theoretical in nature?

A. Kenneth Norberg)

It seems to me, that legally, as I recall, there is nothing in the way to prevent Title VII underwriting basic research, or development of theory, such as you have proposed. As a matter of fact, I believe there is, at least, one approved project of this kind. The problem it seems to me is not so much a legal one, (how can Title VII do it?) the more significant problem is how can you actually get this kind of work done This seems to me to be the difficult question.

A. (C. R. Carpenter)

May I add one comment to that, I think that the understanding of what is meant by research and experimentation in Title VII is very vague. It means everything from a tightly controlled experiment to somebody doing something that is different, or that he thinks is different. Therefore, you have a tremendous range of interpretation, so that I think that within that range, there certainly exists the possibility for tight theoretical considerations, *but* it seems to me, that tight theoretical consideration has to be expressed in some kind of experimentation. It cannot be simply a logical kind of theoretical proposal unless this is linked to some kind of experimentation.

A. (Lester Beck)

I can recall two or three proposals that came in that were pretty highly structured, theoretically, with a minimum of experimental verification, and two out of the three were approved for funding. So 66% of those theoretical proposals were funded in comparison with only one in seven of the applied proposals. Now you should also realize that we don't get very many theoretical proposals. There is a real shortage of them. I think the best theory has been incorporated in some of the applied research projects built around the teaching machines or built around the development of systems. The thinking of the individual, obviously, in influenced by his notions on learning theory or personality theory, but where we do get an application involving the evolution of a theory, these are read very carefully and I can think of two that were approved.

A. (Kenneth Norberg)
I would like to add one comment here and I think many would agree with me that the problem is not so much in lack of theoretical development. There is actually a theory behind every proposed experiment although sometimes the theoretical basis is not made very explicit. I'd like to enlarge on my comment that the problem is how to get this kind of work done. Typically, it seems to me, theories are developed by individuals or small groups of people working over relatively extended periods of time. A man writing a book, for instance, thinks about a book for ten years and then spends two or three more years writing it. This is a typical instance of a significant theoretical development in a particular field. It is a little bit hard to envisage just how you set up a project that is going to take place in one or two years in a rather formal way to come out with this kind of a specific product.

A. (Lester Beck)
In a way this publication (*New Teaching Aids for the American Classroom*) is an answer to part of the question. These men were brought together with the support of Title VII funds to talk as much as possible on a theoretical level, and to plot a kind of a theoretical picture of the future as to the directions they feel that research should take. I should like to add just this point here. My earlier comments on this book, and the fact that Ray Carpenter was talking to Jack Hilgard at this conference, were in no sense derogatory but rather in explanation of the fact that the title of this book is *New Teaching Aids for the American Classroom.* This is the title, and when I picked this up my first impression was well, good, you can look in here and see, operationally, all these aids that are available for the American classroom. This is not the case. This is not an operational manual, this is a research manual. The thinking in this manual is going to endure, it's not going to be outmoded today or tomorrow. There is no urgency about reading it this week. This is material that we'll be studying and discussing and reflecting on two years hence. It will be just as timely then as it is now. It is something we'll constantly come

back to, so here's a kind of a guide for the research worker more than the primary teacher. This is the point I was trying to make.

Q. What are the objectives of this conference beyond Title VII possibilities?

A. (Lester Beck)
Well, as I recall our discussions during the planning sessions, they were along this line. That the exercises that go into the preparation of a research proposal are exercises that anyone should engage in if he is going to carry out some kind of project in a school system whether it's funded or not. In short, we don't need to think in terms of money always in order to implement a given course of action. The kind of thinking and the kind of contacts that need to be made with one's colleagues in drawing up a proposal are the very kinds of things that should precede any sort of activity. I think you were all impressed yesterday with Dick Lewis's description of the tremendous amount of activity that went on at the San Jose campus while they were drawing up their proposal. The number of ideas that they brought together in the formulation of the plan was such that I suspect this plan would have gone ahead whether it was funded with Title funds or not. You couldn't stop it after they got the details of the proposal worked out. Now granted, there is the motivation, the chance of the reward that keeps some people working until the plan is adequately formulated. It was the hope, I think of the planning committee, that out of this conference, with the kind of thinking that goes into research proposals, that this in itself is an effective first step towards the solution of a variety of problems.

Q. Can we have cost analysis research?

A. (C. R. Carpenter)
I would like to make two statements. One is that we at the present time are costing out every course at Penn State. Our comptroller ca tell you precisely what the per-credit-hour is for each individual in each course. This is very valuable information for the faculty person. Where the cost differential is somewhere between say $3 in one course. $60 in another course in Clinical Psychology, or $160 in a course in instrumental music. The problem, however, is one of educating teachers and faculty to the recognition that costs set limits and also money opens up possibilities. For example, we rarely get a proposal which has to do with putting in something new unless there is an addition to budget. Rarely do we have a department saying we've got $185,000 to finance the instruction in this department and by doing it a different way, we're going to spend that $185,000 in a different way. If you propose a different way, even closed circuit television, then the requirement is for another full-time staff member, 6 assistants, a lot of instructional materials, in addition to the $185,000 that the department already

has for operation for one year. I think those of you who have looked at costs and academic faculty behavior, and perhaps the same thing operates on the school level, is that there is something dirty about certain words, cost, expense, efficiency, productivity. These are almost taboo words, you can't use them to promote the new media with faculty people. You immediately create a barrier. This is not our business. It is something undignified to be efficient in an academic setting. Now here you have a whole system of attitudes, deeply built into the behavioral systems of people which have to be changed. How do you do it? Maybe this is a research problem?

Q. How can we influence the prejudices and traditions of a large teaching staff to use the new media?

A. (C. R. Carpenter)
Aren't we expecting here the kind of religious conversion which takes place very suddenly, the restructuring of value systems, professional statuses, role concepts, goals and levels of aspirations in teachers? Shouldn't we expect this to be a major retraining, reorientation job on all levels? I will make the further statement that I think that a great deal of our teacher training has the effect of negatively conditioning teachers to the use of new mass media. Perhaps this is the problem area. I don't know whether it involves research or simply a practical operation. I'm throwing out the two ideas, that to expect an innovation to be accepted almost immediately, within a very short period of time, is perhaps unrealistic, and the idea that perhaps retraining programs have to proceed, and certainly the teachers colleges could play an important role.

Q. How do we find out what research is repetitious and how do we learn about the findings of present studies?

A (C. R. Carpenter)
Under Section B of Title VII several people are working very hard on this. We've had an information survey abstracting project under way for two years, and we're very anxious to give it to Section B of Title VII. Now on the national program of the Fund for the Advancement of Education, one summary report has already been issued. They are very glad to send these to you if you'll write for them to the Ford Foundation, Office of Reports, 477 Madison Avenue, New York.

part 4.

Recommendations of the Conference

Four concurrent discussion groups met on two occasions (see Program Appendix A). At the final session a report was given of the deliberations of each group. Their recommendations follow:

Implementing Needed Research

By JACK V. EDLING
Associate Professor, Education and Psychology, Oregon College of Education

1. Consideration should be given to the problem of research "readiness." There are many places where existing attitudes prevent "manipulating" students in experimental programs. Techniques should be identified that will help create an atmosphere of "acceptance" in which students may be exposed to new experiences and new patterns of learning.

2. A "model" should be devised which will make research findings more "generalizable." (e.g., If the essential functions of the teacher, the media, and the students can be identified, and if the relevancy of certain variables can be determined, such as the region, the type and level of instruction and subject matter, the characteristics of the population, equipment, materials, etc., then perhaps the "functional characteristics of a generalizability model" can be defined and research can be devised which will have greater utility.)

3. More emphasis should be placed on research in the various types of administrative procedures used for the media of instruction. (Note: The findings from this type of research would be enhanced by a "generalizability model.")

4. There is a need for media research in the very small district and in "remote" areas. (Radio, combinations of print and radio, and low cost A-V materials (like Sawyers) were identified as media which would be considered.) The "small grants program" should be

used by the staffs of small schools and those responsible for remote area instruction, as a means for finding answers to pressing problems which are common to those areas.

5. There is a need for research in the "cross media," "systems," or "total" approach to the solution of instructional problems. (This would require a determination of what is basic for a system, i.e., the capabilities and limitations of the media, when employed both single and in combination, should be identified.)

6. More "case history research" should be conducted. In effect, this would constitute a "survey in depth" to be accomplished, perhaps, by nationally or regionally selected teams, and *not* necessarily to be done *without* controls.

7. Much more attention should be given to cooperative research with the emphasis on quality instruction. The need is for cooperation between universities and schools both large and small, among colleges and universities, and between universities and other research oriented agencies. (The idea was widely held that probably the most feasible place to start this type of more comprehensible research was in the "region." Region was broadly defined from areas including a few counties to several states. But, the point was that we must organize ourselves so that we can handle any type of research.)

8. Experiments should be done at least twice and preferably in widely varying situations. (The idea was expressed that an "N" of 2 is enormously greater than an "N" of 1, as far as useable information is concerned.)

9. Techniques must be devised to keep the cycle of research from stopping. There are certain big problems or obstacles which cause the cycle to stop. Ways and means must be found to identify those obstacles and overcome them. (Suggested possible hurdles included the conception of significant problems, the design of adequate testing and evaluative situations, getting the experimental subjects, financing etc.)

10. The personnel problem was identified as one which involved not only the bringing of research to the user (dissemination) but also the problem of bringing the user to the level of research—both doing it and using it (research sophistication). This was conceived as a research problem.

Building Dissemination at State and Regional Levels

By DEAL CROOKER

Assistant Superintendent for Curriculum, Instruction, and Guidance, Department of Public Instruction, Hawaii

11. Almost no research report is satisfactory in one form. Four basic groups were identified which must be reached with the appropriate media. Specifically:

    a. Research information for other researchers.
    b. Applications of research to professional practitioners. (superintendents, curriculum workers, staff)
    c. "Popular approach 1" to community minded groups. (Service groups, community organizations, AAUW, religious groups, etc.)
    d. "Popular approach 2" to general public.

12. A break-away" from archaic methods of disseminating research information must be affected. (Spot announcements on TV. Films presented on TV. Traveling mobile demonstration units, adequately staffed.)

13. A carefully conceived series of sequentially developed experiences for key personnel at national, state, regional and local levels would do much to influence educational policy in a favorable direction. (A minimum of two to three meetings was considered as necessary to create sufficient impact to influence concern for the media of instruction.)

14. There is need for an evaluation of a "saturation approach" to dissemination. (This would involve taking a completed research report on one subject and beaming it simultaneously to each of the 4 groups [see 1 above] using appropriate media.)

15. There was an expression of interest in having the U.S.O.E. employ "public relations" men and methods now available from industry to determine differences, if any, from dissemination techniques currently being used.

16. In plannig dissemination conferences and other group activities consideration should be given, whenever possible, to the involvement of educators of various interests and responsibilities, and non-educators such as PTA representatives, lagislators and interested public.

Translating Research Into Practice

By E. G. SHERBURNE
Head, Department of Visual Television, University of California

17. More "action" research should be supported to serve as examples of the application of research findings. (demonstrations of the applications)

18. More support should be given to reporting via multiple media and methods to multiple audiences.

19. Studies should be undertaken of the process of translating research findings into practice:

    a. by a feasibility study of various schemes.
    b. by a cultural anthropologist approach: cultural patterns and technological change.
    c. by the specialist in persuasion techniques with the object of overcoming resistance to research findings.

20. Information should be collected and circulated about the capabilities and limitations of the research process. More people need to have a better understanding of what research can and cannot do. This for the purpose of developing realistic expectations.

21. There is need for a "clearing house" to provide better and more rapid access to research information.

22. A "report design" should be developed which would synthesize research results and present them in a non-statistical and more useable form.

23. A feasibility study should be undertaken to determine the possible effects of various methods of providing financial assistance for translating research results into practice.

24. Research design should be modified so that is would contribute more to practice. (There was an expression of the idea that some existing media research "is just not good enough to be used.")

The Impact of Technology On Modern Education

By F. HERBERT HITE
Associate Professor of Education, Washington State University

25. The N.E.A. proposal which is intended to review technological developments as they relate to educational needs, and which aims at identifying needed innovations, and would inform the innovators of such needs, should be supported. (The attention of the innovators should be directed to certain obstacles which now prevent full utilization of the new media such as bulk, weight, cost, undependability, etc.)

26. The Title VII, Part B, efforts should be expanded to:
   a. Encourage reporting of critical incidents involving human relationships which occur in the development of research studies.
   b. Encourage administrators to adopt innovations resulting from Title VII research.
   c. Describe implications of research (as well as report findings) and present these implications in the full context of school needs.
   d. Make available appopriate communication techniques to inform lay groups.
   e. Have present at regional meetings individuals associated with approved research projects so that they can personally and informally describe their studies.

27. It is essential that increased efforts be made to encourage the training of all teachers and college instructors in the newer technology.

Appendix A

Program of the Conference

WEDNESDAY, APRIL 20

8:30- 9:30 A.M.	**REGISTRATION**
9:30-10:00 A.M.	**OPENING SESSION—Camellia Room** Chairman: H. B. Roberts—Dean of Instruction Sacramento State College **WELCOME** Guy A. West, President, Sacramento State College Roy E. Simpson, Superintendent of Public Instruction, State of California Department of Education
10:00-10:15 A.M.	**PURPOSE OF CONFERENCE: AN OVERVIEW** Kenneth D. Norberg—Professor of Education and Coordinator of Audio-Visual Services Sacramento State College
10:15-10:45 A.M.	**TITLE VII PROGRAM OF THE N.D.E.A.—BACKGROUND, DEVELOPMENT, AND PRESENT STATUS** C. Walter Stone—Director, Educational Media Branch, Division of Statistics and Research U. S. Office of Education
10:45-11:00 A.M.	**Break**
11:00-12:00 A.M.	**OVERVIEW OF TITLE VII PROJECTS IN THE WESTERN STATES** Chairman: Richard B. Lewis—Professor of Education, Head, Division of Audio-Visual Services San Jose State College
12:00- 1:30 P.M.	**LUNCHEON—El Dorado Room**

1:30- 2:00 P.M. **HOW TITLE VII OPERATES—Camellia Room**

- (a) Operating policies and procedures
- (b) Processing and evaluating Title VII procedures

C. Walter Stone, Director, Educational Media Branch

Division of Statistics and Research
U. S. Office of Education
and Panel

2:00- 2:30 P.M. **THE HISTORY OF A TITLE VII PROPOSAL—A VISUALIZED CASE STUDY**

William R. Rogers—Professor of Education
San Jose State College

Richard B. Lewis—Professor of Education
Head, Division of Audio-Visual Services
San Jose State College

2:30- 2:45 P.M. **Break**

2:45- 4:15 P.M. **REPORTS FROM THE STATES**

- (a) New media research in progress
- (b) Plans for research
- (c) Channels and procedures for disseminating research and use information

Chairman: Harry J. Skelly—Chief, Bureau of Audio-Visual and School Library Education, State of California Department of Education

4:15- 4:30 P.M. **ANNOUNCEMENTS AND ARRANGEMENTS FOR SUBSEQUENT PROGRAM ACTIVITIES**

6:30- 8:00 P.M. **DINNER: GET-ACQUAINTED BANQUET**
El Dorado Room

THURSDAY, APRIL 21

9:00- 9:45 A.M. **STATUS OF NEW MEDIA RESEARCH, Camellia Room**

William H. Allen—Director of Research, Department of Cinema, University of Southern California

9:45-10:30 A.M. **A CRITIQUE OF NEW MEDIA RESEARCH**

Lester F. Beck—Professor of Psychology
Portland State College

10:30-10:45 A.M. **Break**

10:45-12:00 A.M. **NEEDED RESEARCH IN THE NEW MEDIA: PANEL DISCUSSION: GROUP DISCUSSION**

Chairman: Wilbur Schramm—Director, Institute for Communication Research, Stanford University

William H. Allen—Director of Research, Department of Cinema, University of Southern California

Lester F. Beck—Professor of Psychology
Portland State College

12:00- 1:30 P.M. **LUNCHEON—El Dorado Room**

1:30- 2:00 P.M. **ORGANIZATION OF DISCUSSION GROUPS**
Camellia Room

Chairman: Harry J. Skelly—Chief, Bureau of Audio-Visual and School Library Education, State of California Department of Education

2:00- 4:30 P.M. **CONCURRENT DISCUSSION GROUPS**

(On this day, each of the following discussion groups will define its area; spell out the important issues or dominant problems; develop a set of questions to e answered; proceed as far as possible with discussion)

(a) **Implementing Needed Research**

(1) What kinds of research are needed? Controlled research. Status surveys. Action research
(2) What areas or problems are most in need of investigation?
(3) What should be done at the national level; what at the local level?

Chairman: Howard Lee Nostrand, Professor of Romance Languages and Literature, University of Washington.

Recorder: Jack V. Edling, Associate Professor of Education and Psychology, Oregon College of Education.

Consultant: C. R. Carpenter, Director, Division of Academic Research and Services, Pennsylvania State University.

(b) Building Dissemination at State and Regional Levels

(1) What channels and practices are now being used?
(2) How can the states strengthen their internal dissemination practices?
(3) What can be done at the regional and state levels to complement national efforts, such as the Title VII program?

Chairman: Ray McGuire, Curriculum Director, State Department of Education, State of Nevada
Recorder: George H. Roseman, Professor of Education and Coordinator of Audio-Visual Services, Chico State College

Consultant: William Gnaedinger, Director, Audio-Visual Center, Washington State University

(c) Translating Research into Practice

(1) What are the requirements of effective dissemination?
(2) What is the place of "action" research; applied research?
(3) How can researchers and practioners establish suitable two-way communication?

Chairman: E. G. Sherburne, Jr., Head, Department of Visual Communications and Statewide Coordinator of Educational Television, University of California

Recorder: A. H. Howard, Professor of Education, Central Washington College of Education

Consultant: Arthur A. Lumsdaine, Program Director, Training and Education, American Institute for Research

(d) **The Impact of Technology on Modern Education**

(1) What is the state of technology in modern education?
(2) How can technology be used to amplify, or improve the distribution of human effort in teaching? What should be delegated to machines? What not?
(3) How can a better understanding and acceptance of new technology in education be achieved?

Chairman: Walter Martin, Head, Sociology Department
University of Oregon

Recorder: F. Herbert Hite, Associate Professor of Education, Washington State University

Consultant: James Finn, Professor of Education
University of Southern California

7:45- 9:45 P.M. **EVENING SESSION—Camellia Room**

Chairman: Kenneth D. Norberg, Professor of Education, Sacramento State College

Panel: Television, Teaching Machines, and Automation in Education

C. R. Carpenter, Director, Division of Academic Research and Services, Pennsylvania State University

Arthur A. Lumsdaine, Program Director, Training and Education, American Institute for Research
James Finn, Professor of Education, University of Southern California

FRIDAY, APRIL 22

8:45-10:15 A.M. **GENERAL SESSION—Camellia Room**
The New Media and the Challenge to Education: A Visual Presentation

Robert B. Moore, Associate Director, Commission on the Experimental Study of the Utilization of the Staff in the Secondary School, Stanford University

10:15-10:30 A.M. **Break**

10:30-12:00 A.M. **CONTINUATION OF CONCURRENT DISCUSSION SESSIONS**

Each of the Concurrent Groups will continue their discussions and will develop a set of recommendations to the U. S. Office of Education. They will also outline proposed follow-up programs and specific actions to be adopted and carried out by the several states. These recommendations, and proposed programs of action at the state level, will constitute the reports to be given at the final session

12:15-2:30 P.M. **LUNCHEON AND FINAL SESSION—El Dorado Room**

Chairman: Francis W. Noel, Consultant in Audio-Visual Education at Large

Final reports by each of the four "Concurrent" discussion groups

Closing comments and summary—a 10-minute capsule presentation

Appendix B

Current New Media Research In the Western States

Ongoing research in the Western states was reported by selected conferrees. The following summary of the reports indicates both Title VII and "Other New Media Research" now being conducted.

WASHINGTON

Title VII

Project title: A COMPARATIVE EVALUATION OF TWO MODERN METHODS FOR TEACHING A SPOKEN LANGUAGE.

Grantee: University of Washington, Seattle, Washington.

Summary: This study will evaluate achievement in first-year college French when taught through extensive use of audiovisual aids for exposition and pattern drill. It is hypothesized that the teaching procedure will increase ability of students to speak and understand the language without impairing development of reading or writing skills. Comparisons will be made with control classes instructed under another method proposed by the investigator, an oral-aural "dialogue" approach. The experiment will involve a total of approximately 300 students enrolled in 10 classes in beginning French. Tests will be developed to obtain data relative to students' proficiency in 4 language skills: comprehension, speech, reading, and writing. These tests will be administered during the second quarter of instruction. Paralleling the tests will be student and faculty opinion surveys.

After being subjected to one of the two teaching methods used for first and second quarter work in French, students will be amalgamated in third-quarter classes to be taught with an eclectic method. Progress will be evaluated in terms of first and second quarter background.

By HOWARD LEE NOSTRAND

Professor of Romance Languages and Literature, University of Washington

Other New Media Research

By A. H. HOWARD

Associate Professor of Education, Central Washington College of Education

In the Spokane public schools, under the general direction of Forrest Bottomly, research director there, are three studies which are related to the new media. In one study they are attempting to teach German in the elementary schools. The object of the study is to find out what kinds of children learn "fastest" and "bestest" by TV. They will formalize this with the use of some factor analytic techniques. A second study in a Spokane school is part of a staff-utilization study in which they are investigating teaching by a large class, and small class in individual study, in the teaching of Washington history in the high schools. The large classes, especially, are being used to study the effects of the use of some of the mass media like overhead transparencies, films etc. A third study in Spokane has to do with testing the effect of the use of the Controlled Reader Films versus traditional methods of teaching reading at the elementary level. They are also making a study of the effect of these Controlled Reader Films with juniors in the high school level.

In Seattle, Channel 9 is doing some studies; Frank Seely is the Research Director there. Two studies are of note. One is to compare the use of TV alone versus the use of TV plus a teacher versus using the teacher alone, in terms of teaching 5th grade Science units. They are making another study on the effect of TV and teaching calculus and analytical geometry in the high school. The program consists of four half-hour classes per week, viewed by both the teacher and the students together. One of the effects they hope to measure is how this serves an in-service teacher education program.

At Pullman, they are pretty excited over there; at least Herb Hite gave me this impression; there are two pretty good studies going on right now. They have several proposals. One is the use of TV to teach Home Economics with large groups of 100 or more students. It's in the area of sewing—I don't know much about that but I understand it's the Bishop methods. The student groups are in different locations and the object is to develop these particular sewing skills. They are trying to measure what happens by the use of TV with these very large groups. Another study at Washington State University is a feasibility study on the use of kinescopes in college discussion groups on educational methods. They make a film of the discussion, and then use it again with the same group for two purposes. One purpose is to reinforce the learning of the content of the discussion, and a second is to help the members of the group to evaluate their own particular discussion skills and abilities. They also use the films for the enrichment, possibility, of other discussion groups than the one about which the film was made. All of this is preliminary to establishing more formal research designs. They have proposed a couple of other studies in their program. One is a study by educators on the staff there and architects, to plan a new education building for their campus, in which they plan to use the new media in both large and small groups. They are working out a design for such a study now. Another one is proposed to study the effect of teaching machines among different college students who vary according to certain personality characteristics. As you might guess, the psychology people are wound up in this one.

In Seattle at the University of Washington, among the many masters thesis going on there in the College of Education, Alice Hayden told me of one student who, apparently, is making a study of who and why watch TV courses offered over Channel 9. It is supposed to be completed this spring. If you are interested in that study you might contact Alice Hayden at the University of Washington.

At my own institution at Ellensburg, there is one master's study testing the use of graphics with an overhead projector in the use of one of our Freshmen General Psychology courses. We're trying to find out several things. One is whether we can take an Instructor who has been teaching for nearly 40 years, and convince her of the effectiveness of these newer methods. Actually, to find out whether the visual really make a difference in terms of the subject matter learned in this particular setting. We are also planning a study in connection with our use of closed-circuit television. We have a system at our campus connecting our college with the schools in the local community. We have designed it, primarily, for use like at San Jose for observation of teacher education. This is our second year, and we are trying to get together a formal study. We are especially interested in what reaction, attitudinally, our college students have toward the use of this media for their edification, and we are proposing a study in that area.

At the State level we have the Research Committee on Education which was formed by our State Superintendent, in his office, and it is sponsored and funded by them. They have four studies underway. Eugene Smith, a member of the State staff, is the Research Director. One of these four studies has to do with the use of language laboratories in secondary schools and next year, the year 60-61, in Tacoma, this study will be worked out with the objective of determining the effect on language proficiency in the high schools. With reference to the dissemination of information, I'm sure that in our State we are probably weakest of all here. Our State Department, for one, has taken some steps to rectify this situation. The first quarterly issue of a publication called the Educational Research Summary was produced on March 1960. It is a brand new thing, expected to come out quarterly, and no doubt will be edited by Mr. Smith. We hope that this sort of thing will not only tell what's going on in our own state, but nationally as well, and will include research on the new media. Occasionally an article gets into our State Journal so we do get some information through that source. We have a State Audio-Visual organization and, occasionally, at our conferences we discuss research.

NEVADA

By RAY McGUIRE

State Curriculum Director, Carson City, Nevada

After describing the methods of dissemination employed in Nevada, Mr. McGuire explained:

We have no Title VII projects in Nevada at the present time. We have a rather unique situation of a small population and large, large distances and lots of tall mountains. Television has been quite a problem, even the commercial variety. We do have one plan that has been submitted to the U. S. Office by the University of Nevada. It is a psychology project pertaining to teacher training. I don't know all the details of this so I can't elaborate on it. We do have much interest in the new media, and we are here to learn more about them.

ALASKA

By GEORGE T. KEEFE

Area Director, Department of Education, Juneau, Alaska

After reporting that Alaska has no Title VII projects at the present time, Mr. Keefe stated:

We have one little pet project that we have been thinking about, but nothing has been firmed up on this. There are many aspects to it, and we have to take a good hard close look at it. The background is this. We have certain geographical areas within Alaska in which the school population is predominantly Alaska Eskimo and Indian. The areas in which these schools are located are relatively isolated. Village life is the only thing that these people have any contact with—hunting, fishing, trapping, etc. The problem is that these schools consistently through the years score low on our statewide standardized testing programs. Now what we want to do, and I'm not trying to imply that any of this is applicable to Title VII, but there may be parts of it that would apply, we'd like to give the particular schools that are typical of this group a concentrated audio-visual program. As of this time there hasn't been any audio-visual program. They have a slide projector and some filmstrips that we make available to them, but it's a very meager program. Now this is about the only project that we have in mind. I am sorry that none of us in Alaska can contribute very much to this conference. I am here to get all that I can in the way of information relative to Title VII. In the act of becoming a State we are going through quite a few growing pains with reference to finance.

OREGON

Title VII

Project title: A STUDY OF THE EFFECTIVENESS OF AUDIO-VISUAL TEACHING MATERIALS WHEN PREPARED ACCORDING TO THE PRINCIPALS OF MOTIVATIONAL RESEARCH.

Grantee: Oregon College of Education, Monmouth, Oregon.

Summary: The basic hypothesis of this study is that newer media can be employed with greater effectiveness when content of instruction is related to motives of individuals, thereby performing reinforcing or personalizing functions of the teacher. Preliminary to experimentation, approximately 4,000 selected high school students were given 2 tests, a test of goals and a test of interests. An analysis of test data will have as its objective the identification of student motivational patterns. Two motivational patterns will be selected for use in preparing 2 experimental motion pictures. Each of the 2 sound films will specifically relate need for (appropriate) education beyond high school to one of the selected motivational patterns. Study will utilize an experimental design which will permit testing hypotheses relative to (a) the effectiveness of the films on groups of students with similar and dissimilar motivational patterns and (b) the interaction effects between pre-test and communication. The criterion for assessing outcomes will be equivalent forms of an inventory developed to measure attitudes toward education beyond high school. It is estimated that between 2,000 and 3,000 students will participate in the experimental phase of the study.

By JACK V. EDLING

Project Research Director and Associate Professor,
Education and Psychology, Oregon College of Education

Project title: AN EXPERIMENT IN THE USE OF EDUCATIONAL BROADCASTING TO MEET THE GROWING NEEDS OF THE JUNIOR COLLEGE PROGRAM FOR OREGON YOUTH.

Grantee: Oregon State System of Higher Education, Corvallis, Oregon.

Summary: The significance of this investigation rests in the growing need for junior college programs in many communities. The basic objective will be to determine the comparative effectiveness of freshmen and sophomore courses taught by television as against the same courses taught in resident institutions by regular instructors. A faculty committee will select courses considered to test best the effectiveness of a junior college program over television. The experimental courses will involve 4 to 6 30-minute daily broadcasts over an educational television channel during early evening hours Monday through Friday. Students regularly enrolled in the same courses in resident institutions will be used as controls. It is anticipated that all students enrolled in the courses will constitute the population sample, although numbers involved might make random sampling techniques necessary in both experimental and control groups. The testing program of the traditional college courses, modified as deemed necessary, will constitute the criterion variable. In addition, interview techniques will be used to obtain information on student attitudes and achievement.

By MAX SCHWAB
TV Junior College Coordinator, Department of Educational Radio and Television, General Extension Division, O.S.S.H.E., Corvallis, Oregon

Project title: A STUDY OF RESISTANCE FOR EDUCATIONAL PURPOSES: ITS NATURE, PURPOSE, AND CONTROL.

Grantee: University of Oregon, Eugene, Oregon.

Summary: This investigation hypothesizes that it is possible to enlarge an existing television audience by eliminating factors which generate resistance to the medium when used for instructional purposes. Specific objectives will be to discover what these factors are, to ascertain their relative importance, and to experiment with their elimination. Relevant evidence will be obtained by (1) gathering data from the general public in a small community where opportunity exists for viewing educational television; (2) by obtaining data from special groups such as television programmers, educators, and students; (3) by setting up controlled experimental situations in the laboratory for testing reactions to educational presentations; and (4) by altering educational programs in the interest of altering fatcors of audience resistance. Programs of 4 commercial and one educational television station will be available for study. Data will be based upon a sampling of the general public and special groups. Probability samples will be developed from available listings, maps and other sources. Research will require 3 years with approximately 1,000 persons being interviewed each year from the general public and 330 each year from the special groups.

By WALTER MARTIN
Head, Sociology Department, University of Oregon

Other New Media Research:

By D. GLENN STARLIN
Director, Inter-Institutional TV Teaching Project,
University of Oregon, Eugene, Oregon

Another major project which we have been working on and we're in our third year on this at the present time, is an inter-institutional television experiment. We started this in 1957. It involves simultaneous teaching of regular college courses to 4 different institutions of higher education in the State of Oregon. The experiment was conducted under a grant from the Fund for the Advancement of Education and a report has just been ublished entitled: *Inter-Institutional Teaching by Television.* The experiment will continue for three more years under a grant from the Ford Foundation.

Jack Edling of Oregon College of Education and Del Schalock of Oregon State College have been trying to adapt the new media to the field of testing and evaluation. The results of the first two years of their preliminary investigation are being reported, as a matter of fact right now, at the Western Psychological Association meeting at San Jose State College this week. These new film tests aim at deeper levels of understanding than the typical paper and pencil tests and are especially adapted to use over television.

Dr. Slabaugh of Oregon State College is doing some experimentation with stop-action motion pictures and demonstration of corrosion of metals in a Chemistry course, and they are hopeful of developing a series of films in quantitative analysis over there.

In terms of our plans for the future, of course, we plan to continue the research in the Inter-Institutional Television Teaching Project and certain aspects of it in which we are particularly interested and which we haven't looked at, up to the present time. For example, a professor from the University of Oregon is presently seeking a NDEA grant to study video feedback as an element in effectiveness of teaching. Rather than having no feedback, or just audio feedback from the classroom, we have mounted a television camera at the monitor so that the professor who is talking to the televised classes can see how they are reacting to him as he is talking to them. This is just in the application stage and we're not sure if it will continue or not. Also, in the Portland area, Dr. De Bernardis has just been awarded an NDEA grant for determining the need for adapting the physical plant, that is the school design for better use of the new media. We plan to continue research in film, and we are doing just a little bit with teaching machines in terms of some developments by View Master, where records and book readers and stero-picture reels have been developed. These are related to one another for use in the primary grades so that students can learn by this technique and go along at their own rate.

HAWAII

By DEAL CROOKER

Assistant Superintendent for Curriculum, Instruction, and Guidance, Department of Public Instruction, Honolulu, Hawaii

Mr. Crocker reported that Hawaii has no approved Title VII projects and that they held the same general status as Alaska. In addition he stated:

We did apply for one project. I found out today why we didn't get it. That is because San Jose beat us to it. They did it better and they probably got it in a little before ours, so I don't have to ask Dr. Stone why we didn't get it. We'll just use the results of their research. We are behind in the new media in Hawaii. We are using the newer media in many areas. We are using language laboratories and electronic equipment at the elementary level in teaching Japanese, Mandarin Chinese and Hindu. These three languages are spoken by more than half of the world's population.

It should also be noted tha we have an advantage in the fact that we have one school system for the whole State. Although we will probably start late, we will go (fast) and in ten years we may be ahead of you.

CALIFORNIA

Title VII

Project title: THE USE OF CLOSED CIRCUIT TELEVISION AS A MEANS OF IMPROVING TEACHER EFFECTIVENESS.

Grantee: Fontana Unified School District, Fontana, California.

Summary: A study of the effectiveness of portable television equipment as an additional medium for carrying out the objectives of the school district program of in-service education of teachers, administrators, and counselors.

Remotely controlled television observations of classroom teaching and other educational situations will be viewed by teachers or others as appropriate, and will be accompanied and/or followed by discussion.

Evaluation will center about close observation of the viewing-discussion situation and appraisals of teacher growth.

By LEE FOLLIS

Director, Department of Instructional Materials, Fontana, California

Project title: AN INVESTIGATION OF AUDIOVISUAL TECHNIQUES TO IMPROVE THE PARENTS' ATTITUDES TOWARD AND INFORMATION ABOUT THE EDUCATION OF DEAF CHILDREN.

Grantee: John Tracy Clinic, Los Angeles, California.

Project title: TELEVISION UTILIZATION IN THE OBSERVATION PROGRAM FOR TEACHER EDUCATION.

Grantee: San Jose State College, San Jose, California.

Summary: An experimental study to determine whether controlled use of television observation can act as a partial substitute for in-person observation in the training of teachers. The experimental application of television will be in conjunction with a one-semester college course for prospective elementary teachers.

Three experimental and 2 control groups of approximately 20 students each will be established each semester for 5 consecutive semesters. Initial comparability of groups will be investigated. The experimental groups will receive a fixed amount of observation through television (25 percent of the normal in-person observation time) with varying amounts of in-person observation. The control groups will have no television and approximately 70 hours of in-person observation. At the end of each semester each student will have been assessed as to potential teaching competence in 4 areas using a prepared rating scale and 4 raters. Statistical comparison will be made between students in experimental and control groups.

The performance of each student during subsequent student teaching will be assessed using a second rating scale and 6 raters. Comparisons will again be made between students who had been in experimental and control groups.

By WILLIAM R. ROGERS
Professor of Education, San Jose State College
and
RICHARD B. LEWIS
Professor of Education and Head, Division of Audio-Visual Services, San Jose State College

Project title: FOUR YEARS OF RESEARCH ON THE CONTEXT OF INSTRUCTIONAL TELEVISION.

Grantees: Stanford University, Stanford, California; and Denver Public Schools, Denver, Colorado.

Project title: THE EFFECTS OF MENTAL RETARDATION ON FILM LEARNING: A STUDY TO DETERMINE WHAT TYPES OF INSTRUCTIONAL FILM EXPERIENCES ARE MEANINGFUL TO CHILDREN WITH MENTAL RETARDATION, REGULARLY ENROLLED IN PUBLIC SCHOOLS.

Grantee: University of California, Los Angeles, California.

Project title: EXPERIMENTATION AND DEVELOPMENT OF NEW AND MORE EFFECTIVE TECHNIQUES AND METHODS FOR TRAINING TEACHERS IN AND PRESENTING ACADEMIC SUBJECT MATTER THROUGH THE SPECIAL MEDIA OF TELEVISION AND VIDEO TAPES IN THE HEALTH SCIENCES.

Grantee: University of California Medical Center, San Francisco, California.

Summary: A test of methods for overcoming the problem of adequate medical, dental, and nursing student observation of clinical, technical, and operative procedures. The study will proceed in 3 phases: (1) Teachers in 4 courses will practice to find optimum methods of presenting their subjects on television. (2) There will be 3 sections of each course, one to observe instruction directly, one to observe in same room but with television for closer observation of detail, and one with television only. Immediate and delayed written post-tests will assess comparative achievement. Present and television methods will also be compared on the basis of instructor time involved. (3) Video tapes or kinescope presentations will be produced for continuing education of practitioners in other communities. The learning of these subjects will be compared to that of university groups. Public information telecasts will also be produced and evaluated with mail questionnaires.

By THEODORE S. GRANT

Chairman, Committee on Medical Illustrations, Photography and Audiovisual Aids

Project title: A STUDY OF THE NON-LINEARITY VARIABLE IN FILMIC PRESENTATIONS.

Grantee: University of Southern California, Los Angeles, California.

Other New Media Research

By PIERCE PATTERSON

Director, Audio-Visual Services, Orange County Schools, Santa Ana, California

Mr. Patterson emphasized the strong leadership role of the California State Department of Education and described the dissemination activities of the State Audio-visual Association. He then asked Dr. Evan Keislar, Associate Professor of Educational Psychology, U.C.L.A. to describe some of the work he had been doing in programming for teaching machines. Dr. Keislar stated:

Our project was largely a test of one of Piaget's hypotheses that children at the age of 6 and 7 are pseudo-scientific. The hypothesis maintains that these children can't think scientifically. It was our hypothesis that this is the result of culture, that children give animistic phenomenological explanations of scientific events simply because they have not been taught to give mechanical scientific explanations. So our thesis was that if we could teach these children something about the scientific explanation of the evaporation and condensation of water, they would be able then to improve their ability to give appropriate explanations of these physical phenomena. We selected therefore as our subjects, children in the first grade. Our goal was to teach these children molecular theory in relation to evaporation and condensation of water. In order to keep a good scientific record of the instruction that we gave them during a 3 weeks unit, we used automated teaching in the form of a program on teaching machines.

The machines themselves have been jointly developed, by us, from machines that we used a year ago, and by Hughes Aircraft, machines used over the years in their assembly line. This device simply presents a rear view projection of colored slides on a viewing plate, and at the same time a tape recorder inside the device plays through earphones to the child. The slides are changed on signal from the tape. The machine stops after the question is asked and the child presses one of three buttons to indicate his answer, choosing the picture on the slide which he thinks is appropriate. If he is correct he gets the green light, the voice says good for you, and it proceeds to the next slide and the next question. If he does not get the item right, he presses another button to reset the device, thus permitting himself to try again. He must get the item right to proceed. The device will be available for inspection but I do want to hasten to add that we just got this device about a week ago and, to date, all our programming has been done with the humans simulating the machine.

What we have done is to interview children, up to now approximately 18 or 20 children, in 3 different tryouts of our program with approximately 300 to 400 items which were drawn on parts. The program itself, it seems to me, is the most exciting part of this venture because herein you have the complete record of what you teach the child. The program, primarily, at this point needs a conceptual framework, we need to have a better view of how the sequences should be run and organized. I have a sample of the way in which I think this, at least, might be tackled by means of breaking up the unit into something like 30 different subtopics which would be arranged sequentually in terms of the logic. Within each subtopic there are another group of items using Gilbert's method of coding items that I think has been very helpful to us—lead in, normative, informative items etc. We have found it quite useful to use symbols to communicate to these children. It is very important in this unit to talk about molecular movement, because the movement is essential and we've used vectors, therefore, behind the little molecules to indicate both direction and speed of the molecules. Our criterion has been, in all tests, to have the children to be able to talk about the explanations, not just simply point to pictures to give their answers. Therefore, for each one of these three tryouts of our program, we have always had individual, oral interviews in which the children are asked such questions as: In hot water do the molecules move faster than they do in cold water? Why do clothes get dryer faster on a hot day than on a cloudy day? The program itself is the real important thing."

Special Report

Under the title, THE NEW MEDIA AND THE CHALLENGE TO EDUCATION, a visual report was made by Robert B. Moore, Associate Director, Commission on the Experimental Study of the Utilization of the Staff in the Secondary School, Stanford University.

Appendix C

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